United States Department of Agriculture

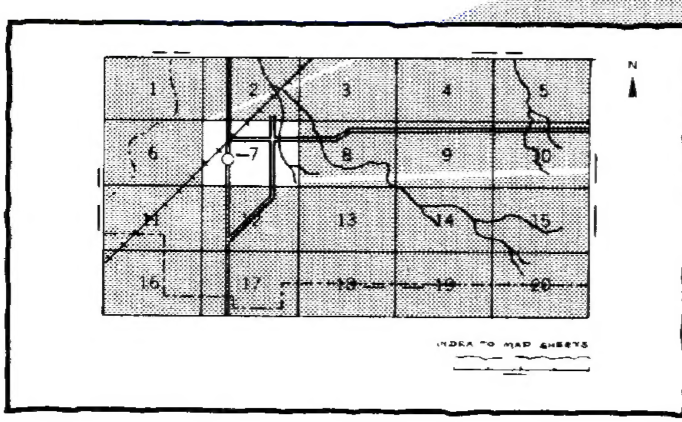
Soil Conservation Service

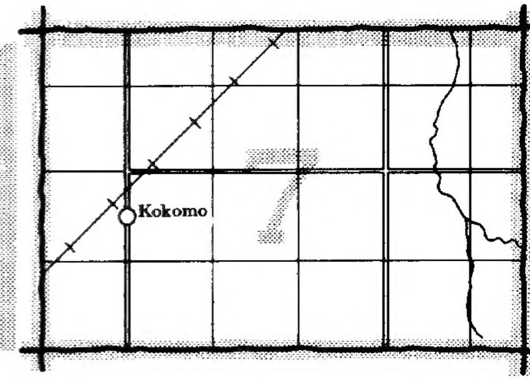
In cooperation with Louisiana Agricultural Experiment Station and Louisiana Soil and Water Conservation Committee

Soil Survey of Catahoula Parish, Louisiana

HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets."





2. Note the number of the map sheet and turn to that sheet.

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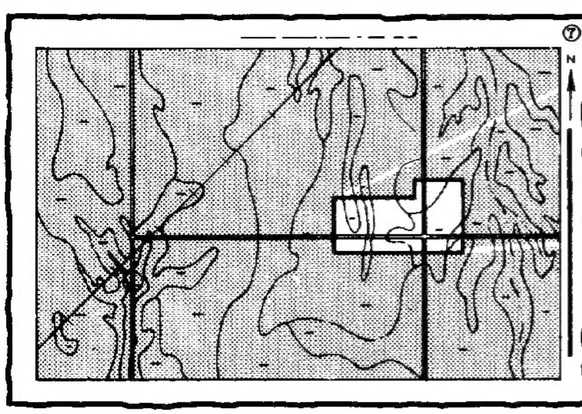
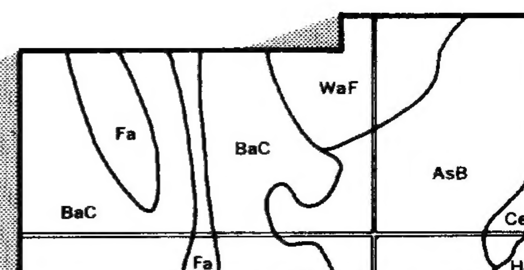
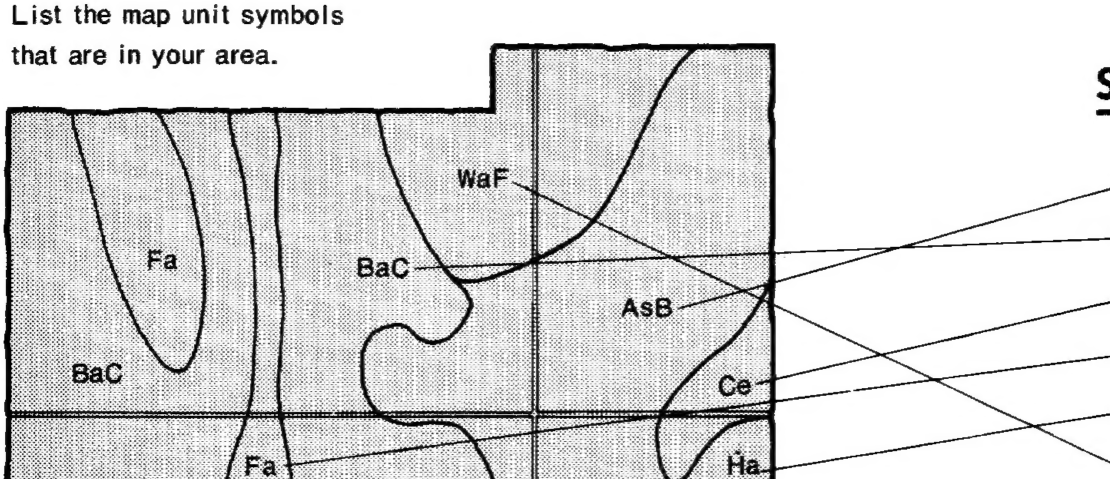




4. List the map unit symbols that are in your area.

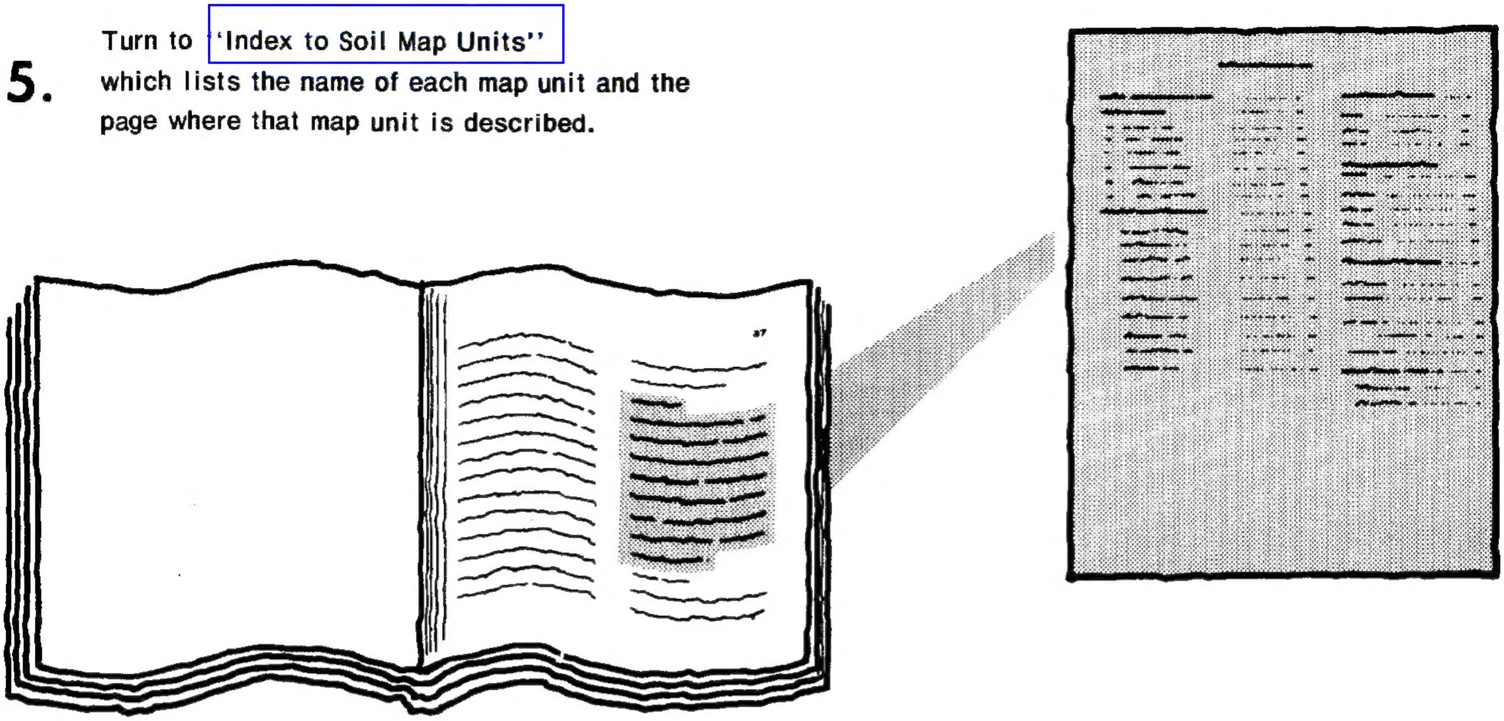


Symbols

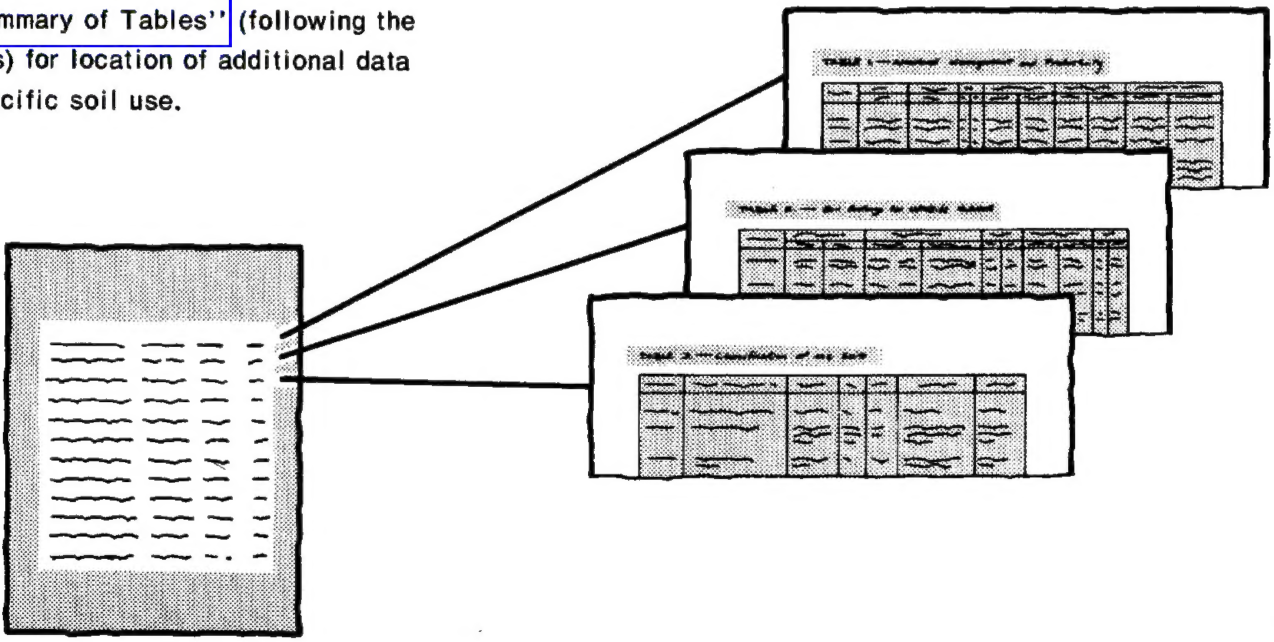
AsB
BaC
Ce
Fa
Ha
WaF

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This soil survey was made cooperatively by the Soil Conservation Service, the Louisiana Agricultural Experiment Station, and the Louisiana State Soil and Water Conservation Committee. It is part of the technical assistance furnished to the Catahoula Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Tew Lake is one of several scenic oxbow lakes in Catahoula Parish that were left where the old Arkansas River once flowed. Lakes, such as this one, provide habitat for fish and wetland wildlife and are extensively used as recreational areas.

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Foreword

This soil survey contains information that can be used in land-planning programs in Catahoula Parish. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

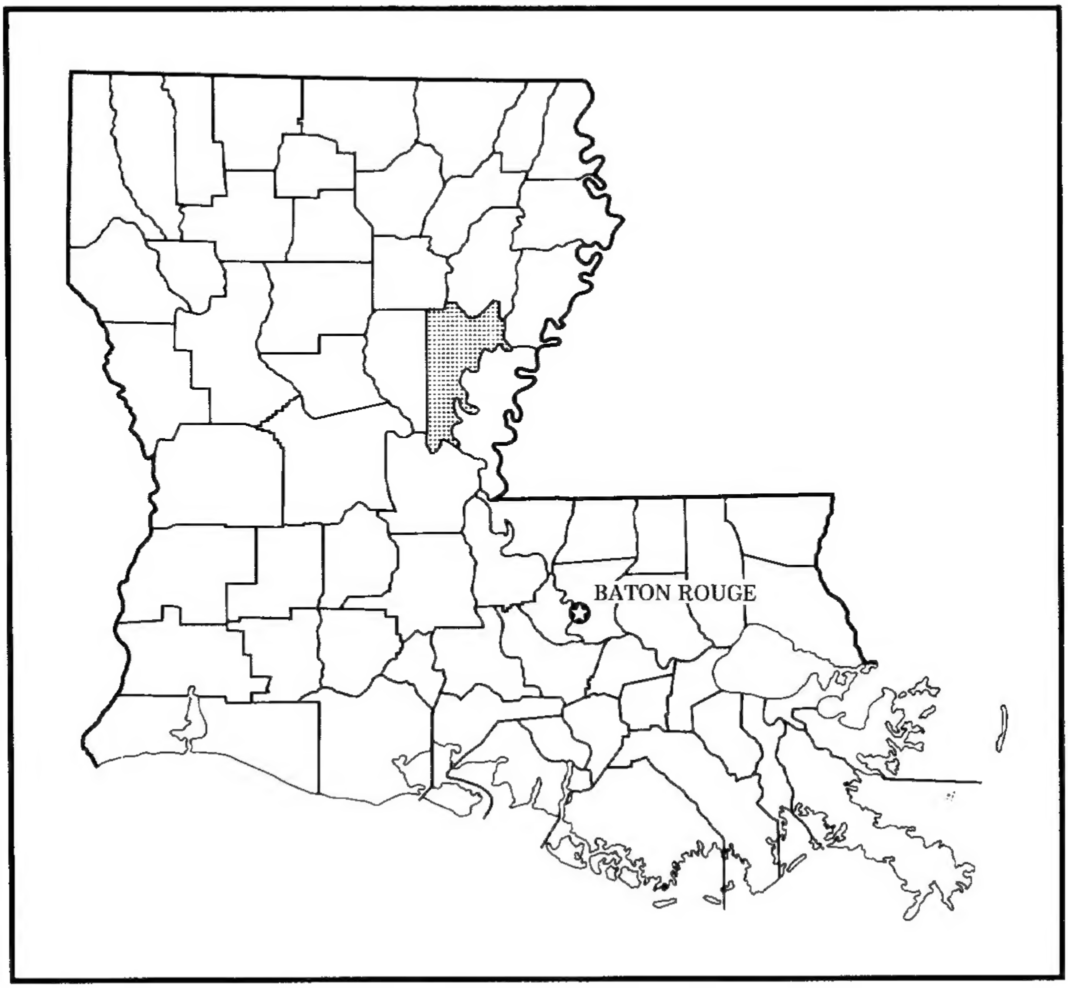
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Horace J Austin

Horace J. Austin
State Conservationist
Soil Conservation Service



Location of Catahoula Parish in Louisiana.

Soil Survey of Catahoula Parish, Louisiana

By William H. Boyd, Soil Conservation Service

Fieldwork by William H. Boyd, Gail Bowden, and Charles E. Martin,
Soil Conservation Service, and
Emille Williams, Louisiana Soil and Water Conservation Committee

United States Department of Agriculture, Soil Conservation Service
In cooperation with Louisiana Agricultural Experiment Station and
Louisiana Soil and Water Conservation Committee

CATAHOULA PARISH is in east-central Louisiana. Harrisonburg, the parish seat, is in the north-central part of the parish and is about 50 miles northeast of Alexandria.

The parish is chiefly rural and had a population of 12,287 in 1980. It has a total area of 480,554 acres, of which 19,555 acres is lakes, bayous, and rivers. Land use is mainly agriculture and woodland. About 65 percent of the land is cultivated cropland and pasture, and 30 percent is woodland.

The three major physiographic areas that make up the parish are alluvial plains, stream terraces, and uplands. The alluvial plains make up about 71 percent of the parish. They consist of level to undulating soils on natural levees along channels of the Black, Little, Ouachita, Red, and Tensas Rivers, and of low, level soils between the natural levees. Elevations range from about 40 to 60 feet above sea level. Most of the soils along the natural levees are loamy and high to medium in fertility. They are used mainly for cultivated crops and pasture. The main crops on these loamy soils are cotton, soybeans, and grain sorghum. The soils in the low areas between natural levees are clayey and high to medium in fertility. They are used for cultivated crops, pasture, woodland, and as habitat for wildlife. The main crops on these clayey soils are soybeans, grain sorghum, and rice.

The stream terraces make up about 9 percent of the parish. These terraces are locally referred to as the Macon Ridge (a high stream terrace) and the Wallace Ridge (a lower stream terrace). Elevations range from 45 to 55 feet above sea level on Wallace Ridge and from 55 to 75 feet on Macon Ridge. The soils are mainly loamy throughout and are used mostly for cultivated crops and pasture. Cotton, soybeans, and grain sorghum are the main crops.

The uplands make up the remaining 20 percent of the parish. They consist of gently sloping to steep soils on ridgetops, side slopes, and in drainageways. Elevations range from about 75 to 320 feet above sea level. These soils range from deep sands to heavy clays and are used almost exclusively as woodland and habitat for wildlife. Large timber companies own most of this acreage.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent parishes. Differences are the result of better information on soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey area.

General Nature of the Parish

This section gives general information concerning the parish. It discusses climate, history and development, agriculture, transportation, flood control, and water resources.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Belah Fire Tower in the period 1952 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 49 degrees F, and the average daily minimum temperature is 38 degrees. The lowest temperature on record, which occurred at Belah Fire Tower on January 12, 1962, is 12 degrees. In summer the average temperature is 81 degrees, and the average daily maximum temperature is 92 degrees. The highest recorded temperature, which occurred at Belah Fire Tower on August 6, 1964, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 58 inches. Of this, 29 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 22 inches. The heaviest 1-day rainfall during the period of record was 9.5 inches at Belah Fire Tower on April 29, 1953. Thunderstorms occur on about 65 days each year, and most occur in summer.

The average seasonal snowfall is 1 inch. The greatest snow depth at any one time during the period of record was 5 inches. On the average, there is seldom a day that has at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southeast. Average windspeed is highest, 10 miles per hour, in spring.

History and Development

Catahoula Parish was established as a political unit in 1808 when it was separated from Rapides Parish. Its name derived from the Choctaw Indian term "Okattahoula," which means big, clear water. This is in reference to Catahoula Lake.

Choctaw Indians inhabited the area when the early white settlers arrived. The southern part of the parish was settled mainly by French and Acadians who came north from Avoyelles Parish. Anglo-Saxons traveling westward from other states settled in the northern part of the parish. Some of these early settlers were given Spanish Land Grants.

Harrisonburg was settled around 1800. The settlement became important as a trade center because of its location at the intersection of the Ouachita River and the Chisholm Trail. Ft. Beauregard, which was within the Harrisonburg city limits, was an important Confederate fort on the Ouachita River during the Civil War.

Trinity, located on a narrow Peninsula between the Ouachita and Little Rivers, was settled around 1833. It was an important fishing and trade village. Jonesville was established at a later date across the Little River from Trinity. The community of Sicily Island was settled early because of its position on the flood-free Macon Ridge.

Important nonagricultural industries in the parish include oil, gravel mining, fishing, and a garment factory.

Agriculture

Catahoula Parish has always been an agricultural parish. The early settlers grew a variety of crops and raised livestock for subsistence. Indigo was the main cash crop of the early settlers. Cotton later became the main cash crop and remains today as one of the major crops grown in Catahoula Parish. In 1983, about 14,400 acres of cotton, valued at 7,452,000 dollars, was harvested. Corn was an important cash crop, but its acreage has declined. In 1983, only about 600 acres of corn were planted in the parish.

Large areas of bottom land hardwoods have been cleared and drained for use as cropland in the last 20 years. This land has been used primarily for soybeans. Approximately 137,300 acres was planted to soybeans in 1983, with a crop value of about 22,575,000 dollars. Other important crops include grain sorghum, wheat, and rice. A variety of horticultural crops are grown in home gardens.

In 1983, the total value of farm products produced in Catahoula Parish was 50,327,000 dollars. Of this, 80 percent was from farm crops, 3 percent from livestock, and 17 percent from forest products. Total agricultural income in 1960 was 4,062,000 dollars.

The present trend in agriculture in Catahoula Parish is toward fewer, larger farm units. Clearing land for soybean production has slowed, but it is expected to continue until most bottom land hardwood forests, not dedicated to wildlife habitat, are cleared and put into cultivation. Total acreage of cropland has increased from 124,733 acres in 1959 to about 250,000 acres in 1983.

Transportation

Catahoula Parish is served by one major U.S. highway and several paved state and parish highways. An airport,

in Jonesville, serves small private and commercial aircraft.

Two major water transportation routes, the Red River and the Ouachita-Black River system, serve Catahoula Parish. Two grain terminals and one oil terminal are served by tugs and barges, which travel up the Red River, through the Jonesville Lock and Dam, and into the Black and Ouachita Rivers. Travel on the Red River is seasonal and limited mainly to winter and spring. Construction is nearing completion on a lock and dam system on the Red River. These locks and dams will greatly improve the Red River for barge traffic. Access to the Mississippi River is available through the Old River locks near the mouth of the Red River.

Flood Control

Catahoula Parish is at a critical point in the lower Mississippi River flood control system. Because several rivers flow through the parish, Catahoula Parish has experienced many floods, and much attention has been focused on flood control in the parish.

Most of the flooding is caused by backwater when water levels are high in the Mississippi, Atchafalaya, and Red Rivers. During this period, water backs up in the Black, Little, Ouachita, Tensas, and Beouf River systems, causing flooding of the low areas in the parish. This flooding is often further aggravated by heavy local storms.

Flood control in the parish is provided by the Black River, Little River, and the Catahoula Lake Diversion Channel levee systems. Several privately constructed levee systems also protect thousands of acres of agricultural land in areas that are not protected by the major levees. About 100,000 acres of land within the parish is protected from flooding, and about 260,000 acres is either unprotected or inadequately protected. The Sicily Island Levee System, when complete, will protect an additional 60,000 acres from flooding.

This soil survey can be used to locate the areas that are subject to flooding. They are delineated on the maps, and the frequency, duration, and season of flooding are given in the section "Detailed Soil Map Units." Soils that generally flood more often than 2 years out of 5, between June 1 and November 30, are described as "frequently flooded." Those soils that generally flood less often than 2 years out of 5, and more often than 1 year out of 10, between June 1 and November 30 are "occasionally flooded." Soils that generally flood less often than 1 year out of 10, between June 1 and November 30, are "rarely flooded." Soils that are not subject to flooding or are adequately protected from flooding by levees or pump-off systems are classified as "nonflooded."

This soil survey does not replace onsite investigation. The actual flooding frequencies and height of flood waters are best determined by onsite engineering surveys and flood stage records.

Water Resources

Surface Water. —Catahoula Parish has about 20,000 acres of surface water. The Beouf, Black, Ouachita, Red, and Tensas Rivers are the largest sources of surface water. Other important streams are Bayou Louis, Big Creek, Bursley Bayou, Bursley Creek, Ford Creek, Gastis Creek, Haha Bayou, Hawthorn Creek, Kennedy Creek, Little River, Rawson Creek, and Saline Bayou. Lake Louis, Larto Lake, Means Lake, Shad Lake, Tew Lake, and Wallace Lake are the largest lakes in the parish.

Ground Water. —Two major water bearing aquifers underlie Catahoula Parish *(16)*. These aquifers are in alluvial deposits and in deposits of Miocene age. Each deposit is composed of numerous sandy zones that may act as individual aquifers.

The alluvial deposits form the most important aquifers. These deposits of Quaternary age are composed of sand, gravel, and clay and are from less than 100 feet to about 250 feet thick. Most wells are less than 200 feet deep and produce from 250 to 2,000 gallons per minute. The excessive hardness and high iron content make the water from these wells unsuitable for municipal use, unless it is treated.

Sands of Miocene age outcrop in the northwest part of the parish and underlie the alluvial deposits in most of the parish at a depth of a few feet to 250 feet. These sands contain soft, sodium bicarbonate water that is suitable for most uses without treatment. The water bearing strata is from about 100 feet below sea level in the northern part of the parish to about 700 feet in the southern part. A line drawn diagonally to the southwest from about 2 miles south of Jonesville to about 1 mile north of the Catahoula Lake Diversion Channel on the parish line, represents the southern limit of fresh water in the Miocene deposits in Catahoula Parish. Wells in the Miocene sands produce from a few gallons to about 300 gallons per minute.

An exception to the abundance of ground water occurs in the northwest corner of Catahoula Parish, where marl, shale, and clay yield little or no water to wells. These deposits of the Jackson and Vicksburg Groups also underlie the alluvial deposits in the northern part of the parish and mark the base of fresh ground water in that area.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed

the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting

(dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the survey area vary widely in their potential for major land uses. Table 4 shows the extent of the map units shown on the general soil map. It lists the suitability of each, in relation to that of the other map units, for major land uses and shows soil properties that limit use. Soil suitability ratings are based on the practices commonly used in the survey area to overcome soil limitations. These ratings reflect the ease of overcoming the limitations. They also reflect the problems that will persist even if such practices are used.

Each map unit is rated for *cultivated crops, pastureland, woodland,* and *urban uses*. Cultivated crops are those grown extensively in the survey area. Pastureland refers to pastures of native and improved grasses for livestock. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments.

The boundaries of the general soil map units in Catahoula Parish were matched, where possible, with those of the previously completed surveys of Avoyelles, Concordia, Franklin, and Tensas Parishes. In a few places, however, the lines do not join and the names of the map units differ. These differences resulted mainly because of changes in soil series concepts, differences in map unit design, and changes in soil patterns near survey area boundaries.

The general soil map units in this survey have been grouped into four general landscapes. Descriptions of each of the broad groups and the map units in each group follow.

Soils on Alluvial Plains That are Subject to Flooding

This group of map units consists of somewhat poorly drained and poorly drained soils that have a clayey or loamy surface layer and a clayey, loamy, or clayey and loamy subsoil. The four map units in this group make up about 34.5 percent of the parish. Most of the acreage is in cultivated crops or woodland. Wetness and the hazard of flooding are the main limitations for most uses.

1. Sharkey

Level, poorly drained soils that are clayey throughout and have an alkaline and acid subsoil; formed in Mississippi River alluvium

This map unit consists of soils on broad flats and in depressional areas on alluvial plains. Most areas of soils in this map unit are subject to occasional flooding during the cropping season. The area south of Catahoula Lake Diversion Channel is subject to frequent flooding. Slope is generally less than 1 percent.

This map unit makes up about 10 percent of the parish. It is about 81 percent Sharkey soils and 19 percent soils of minor extent.

The Sharkey soils are in low positions on flood plains. They are poorly drained. Typically, the surface layer is dark grayish brown, medium acid or slightly acid clay, and the subsoil is gray, medium acid to mildly alkaline clay. The underlying material is gray, mildly alkaline or moderately alkaline clay.

Of minor extent are the somewhat poorly drained Dundee and Tensas soils in high positions on natural levees, the very poorly drained Fausse soils in the lowest positions on alluvial plains, and the poorly drained Sostien soils along manmade, dredged channels.

Most of the soils in this map unit have been cleared and are used for crops, mainly soybeans. Grain sorghum and rice are also grown. The remaining acreage is in woodland that is used as habitat for wildlife and for timber production.

The soils in this map unit are mainly somewhat poorly suited to crops and pasture. Frequently flooded areas are poorly suited to these uses. Wetness, poor tilth, and the hazard of flooding during the growing season are the

main limitations. Surface drainage systems and flood protection are needed for crops and pasture.

The soils in this map unit are moderately well suited to woodland. The dominant trees are Nuttall oak, overcup oak, green ash, sugarberry, water hickory, baldcypress, and black willow. Logging operations are generally limited to the summer and fall because of wetness and flooding during winter and spring.

The hardwood forests in this map unit provide habitat for many woodland and wetland wildlife. A large area in the state-owned Saline Wildlife Management Area is intensively managed mainly for this use.

The soils in this map unit are poorly suited to sanitary facilities and recreation developments. It is generally not suited to use as homesites. Wetness, very high shrink-swell potential, very slow permeability, low strength for roads, and the hazard of flooding are the main limitations. Major flood control structures are necessary.

2. Alligator-Perry

Level to undulating, poorly drained soils that are clayey throughout and have an acid subsoil; formed in Mississippi, Arkansas, and Ouachita River alluvium

This map unit consists of soils in broad, level areas and in gently undulating and undulating areas on alluvial plains. The soils in this map unit are subject to occasional and frequent flooding during the cropping season. Slope is less than 1 percent.

This map unit makes up about 15 percent of the parish. It is about 78 percent Alligator soils, 15 percent Perry soils, and 7 percent soils of minor extent.

The Alligator soils are in low positions on flood plains. The surface layer is dark gray, strongly acid clay, and the subsoil is gray, very strongly acid or strongly acid clay. The underlying material is gray, neutral clay.

The Perry soils are in low positions on natural levees. The surface layer is dark grayish brown, very strongly acid clay. The upper part of the subsoil is gray, very strongly acid clay, and the lower part is reddish brown, slightly acid clay. The soils have a high water table from December through April.

Of minor extent are the somewhat poorly drained Hebert and Tensas soils, the poorly drained Guyton soils, and the very poorly drained Fausse soils. The Hebert and Tensas soils are on low ridges and in intermediate positions on natural levees. The Guyton soils are on alluvial fans of streams that drain the uplands. The Fausse soils are in the lowest positions on flood plains.

Most of the soils in this map unit have been cleared and are used for crops, mainly soybeans. Grain sorghum is also grown. The remaining acreage is in woodland that is used for timber production and as habitat for wildlife.

The soils in this map unit are somewhat poorly suited to crops and pasture. Frequently flooded areas are poorly suited. Poor tilth, wetness, and the hazard of flooding are the main limitations. In some years, flood waters do not recede in time to plant a crop. Surface drainage systems and flood protection are needed.

The soils in this map unit are moderately well suited to woodland. The dominant trees are eastern cottonwood, Nuttall oak, overcup oak, water oak, green ash, and sweetgum. Equipment use limitations caused by wetness and flooding are the main concerns in management.

The soils in this map unit are poorly suited to sanitary facilities, building site development, and recreation. They are generally not suited to homesites. Wetness, very high shrink-swell potential, and the hazard of flooding are the main limitations. Flooding can be controlled by the use of major flood control structures.

3. Tensas-Alligator

Level to undulating, somewhat poorly drained and poorly drained soils that have a clayey surface layer and an acid, loamy and clayey subsoil; formed in Mississippi River alluvium

This map unit consists of soils in broad, level areas and in gently undulating and undulating areas on alluvial plains. The soils in this map unit are subject to occasional and frequent flooding during the cropping season. Slopes range from 0 to 5 percent.

This map unit makes up about 4.5 percent of the parish. It is about 63 percent Tensas soils, 24 percent Alligator soils, and 13 percent soils of minor extent.

The somewhat poorly drained Tensas soils are on low ridges and in intermediate positions on natural levees along drainageways. The surface layer is dark grayish brown, medium acid silty clay, and the subsoil is dark grayish brown and grayish brown, very strongly acid or strongly acid silty clay and silty clay loam.

The Alligator soils are in swales and are poorly drained. The surface layer is dark grayish brown clay, and the subsoil is gray clay. These soils have a high water table from December through April.

Of minor extent are the somewhat poorly drained Dundee soils and the very poorly drained Fausse soils. The Dundee soils are in high positions on natural levees, and the Fausse soils are in depressional areas.

Most of the soils in this map unit have been cleared and are used for crops, mainly soybeans. The remaining acreage is in woodland that is used for timber production and as habitat for wildlife.

The soils in this map unit are somewhat poorly suited to cultivated crops and pasture. Poor tilth, wetness, irregular slopes, and the hazard of flooding are the main limitations. A surface drainage system and flood protection are needed.

The soils in this map unit are moderately well suited to woodland. The dominant trees include willow oak, Nuttall oak, overcup oak, water oak, green ash, sweetgum, and eastern cottonwood. Equipment use limitations caused by wetness and flooding are the main concerns in management.

The soils in this map unit are poorly suited to sanitary facilities, building site development, and recreation. They are generally not suited to use as homesites. Wetness, very high shrink-swell potential, and the hazard of flooding are the main limitations. Major flood control structures are necessary.

4. Guyton

Level, poorly drained soils that are loamy and acid throughout; formed in local stream alluvium

This map unit consists of soils on narrow flood plains and on alluvial fans of streams that drain the uplands. Most areas of soils in this map unit are subject to frequent flooding. Some large areas on alluvial fans are subject to rare flooding. Slope is dominantly less than 1 percent.

This map unit makes up about 5 percent of the parish. It is about 90 percent Guyton soils and 10 percent soils of minor extent.

The Guyton soils have a surface layer of grayish brown, medium acid silt loam and a subsurface layer of light brownish gray, medium acid and very strongly acid silt loam. The subsoil is grayish brown, very strongly acid silty clay loam.

Of minor extent are the poorly drained Alligator soils, the somewhat poorly drained Hebert soils, and the well drained Oula and Smithdale soils. The Alligator soils are in low positions on some of the alluvial fans. The Hebert soils are in slightly higher positions than the Guyton soils. The Oula and Smithdale soils are on side slopes of uplands adjacent to Guyton soils.

Most of the soils in this map unit are used as woodland. A few large areas south of the town of Manifest have been cleared for use as cropland and pastureland. Soybeans and grain sorghum are the main crops. The uncleared acreage is in mixed hardwoods and pine.

The soils in this map unit are poorly suited to cropland and somewhat poorly suited to pastureland. Wetness, low fertility, and the hazard of flooding are the main limitations.

The soils in this map unit are moderately well suited to woodland. Areas of these soils that are subject to rare flooding are well suited to this use. The dominant trees are loblolly pine, sweetgum, green ash, southern red oak, and water oak. Equipment use limitations and seedling mortality are the main concerns in woodland production.

The soils in this map unit are poorly suited to sanitary facilities, building site developments, and recreational uses. Frequently flooded areas are generally not suited to use as homesites. Wetness and the hazard of flooding are the main limitations.

Soils on Alluvial Plains That are Protected From Flooding or are Subject to Rare Flooding

This group of map units consists of poorly drained, somewhat poorly drained, and well drained, loamy and clayey soils. The five map units in this group make up about 39.5 percent of the parish. Most of the acreage is in crops. Pastureland and woodland areas commonly are small and scattered. Seasonal wetness is the main limitation for most uses.

5. Sharkey-Tensas

Level, poorly drained and somewhat poorly drained soils that have a clayey surface layer and an alkaline and acid, clayey and loamy subsoil; formed mainly in Mississippi River alluvium

This map unit consists of soils on broad flats and in depressional areas on alluvial plains. Large areas of soils in this map unit are subject to rare flooding. Slope is generally less than 1 percent.

This map unit makes up about 16 percent of the parish. It is about 77 percent Sharkey soils, 18 percent Tensas soils, and 5 percent soils of minor extent.

The poorly drained Sharkey soils are in low positions on alluvial plains. The surface layer is dark grayish brown, medium acid clay. The subsoil is gray clay throughout and is medium acid in the upper part and mildly alkaline in the lower part.

The somewhat poorly drained Tensas soils are in intermediate positions on natural levees. The surface layer is dark grayish brown, medium acid silty clay. The subsoil is dark grayish brown, very strongly acid silty clay in the upper part and grayish brown, strongly acid silty clay loam in the lower part. The underlying material is brown, strongly acid silt loam.

Of minor extent are the somewhat poorly drained Dundee soils, the very poorly drained Fausse soils, and the somewhat poorly drained Moreland soils. The Dundee soils are in high positions on natural levees. The Fausse soils are in the lowest positions on flood plains. The Moreland soils are in low positions on the nearby flood plain of the Red River.

Most of the soils in this map unit are used for crops, mainly soybeans. Cotton, wheat, rice, and grain sorghum are also grown. The remaining acreage is in woodland and pastureland. Wooded areas are used for timber production and as habitat for wildlife.

The soils in this map unit are moderately well suited to crops and pasture. Wetness and poor tilth are the main limitations. A surface drainage system is generally needed for crops and pasture.

The soils in this map unit are well suited to woodland. Equipment use limitations and seedling mortality are the main concerns in management. The dominant trees are Nuttall oak, water oak, sweetgum, and sugarberry.

The soils in this map unit are poorly suited to sanitary facilities, building site development, and recreation areas.

Wetness, very high shrink-swell potential, and the hazard of flooding are the main limitations.

6. Tensas-Alligator-Dundee

Gently undulating and undulating, somewhat poorly drained and poorly drained soils that are dominantly clayey or loamy throughout and have an acid subsoil; formed in Mississippi River alluvium

This map unit consists of soils in gently undulating and undulating areas on alluvial plains. The clayey soils in swales are subject to rare flooding. Slopes range from 0 to 5 percent.

This map unit makes up about 8 percent of the parish. It is about 37 percent Tensas soils, 27 percent Alligator soils, 21 percent Dundee soils, and 15 percent soils of minor extent.

The somewhat poorly drained Tensas soils are on low ridges. The surface layer is dark grayish brown, medium acid silty clay. The subsoil is grayish brown silty clay and silty clay loam. It is very strongly acid in the upper part and strongly acid in the lower part.

The poorly drained Alligator soils are in swales. The surface layer is dark gray, strongly acid clay. The subsoil is gray, very strongly acid or strongly acid clay.

The somewhat poorly drained Dundee soils are on low ridges and in high positions on natural levees. The surface layer is very dark grayish brown, slightly acid silt loam or silty clay loam. The subsoil is dark grayish brown and grayish brown, medium acid or strongly acid silty clay loam and loam.

Of minor extent are the very poorly drained Fausse soils that are in the lowest positions on alluvial plains.

Most of the soils in this map unit have been cleared and are used for crops, mainly soybeans. Cotton, wheat, and grain sorghum are also grown. The remaining acreage is in woodland that is used for timber production and as habitat for wildlife.

The soils in this map unit are moderately well suited to crops and well suited to pasture. Wetness, poor tilth, and irregular slopes are the main limitations. Drainage is generally needed for crops and pasture.

These soils are well suited to woodland. Equipment use limitations and seedling mortality are the main concerns in management. The dominant trees are cherrybark oak, green ash, water oak, sweetgum, and eastern cottonwood.

These soils are poorly suited to sanitary facilities, building site development, and recreation areas. Wetness, moderate and very high shrink-swell potential, the hazard of flooding, and moderately slow and very slow permeability are the main limitations to most uses.

7. Norwood-Roxana

Level, well drained soils that are loamy and alkaline throughout; formed in Red River alluvium

This map unit consists of soils in high and intermediate positions on natural levees of the Red River. Most areas of these soils are subject to rare flooding. A few areas are on the unprotected side of the Red River levee and are subject to frequent flooding. Slope is generally less than 1 percent.

This unit makes up about 1.5 percent of the parish. It is about 56 percent Norwood soils, 27 percent Roxana soils, and 17 percent soils of minor extent.

The Norwood soils are in high and intermediate positions on natural levees. The surface layer is reddish brown, mildly alkaline silt loam, and the subsoil is yellowish red, mildly alkaline silt loam. The underlying material is yellowish red, moderately alkaline silt loam and very fine sandy loam.

The Roxana soils are in high positions on natural levees. The surface layer is yellowish red, mildly alkaline very fine sandy loam. The underlying material is yellowish red and reddish yellow, moderately alkaline very fine sandy loam.

Of minor extent are the somewhat poorly drained Moreland soils in lower positions than Norwood and Roxana soils and the well drained Udifluvents on spoil material along dredged canals.

Most of the soils in this map unit have been cleared and are used for crops, mainly soybeans. Cotton, wheat, corn, and grain sorghum are also grown. The remaining acreage is in woodland, mainly mixed hardwoods.

The soils in this map unit are well suited to crops and pasture. The loamy surface layer, high fertility, and level slopes favor these uses. The few included areas that are subject to frequent flooding are poorly suited to crops and pasture.

The soils in this map unit are well suited to woodland. The dominant trees are cherrybark oak, Nuttall oak, eastern cottonwood, sweetgum, pecan, and American sycamore. The soils in this map unit have few limitations to timber production.

The soils in this map unit are poorly suited to sanitary facilities. Moderate permeability, seepage, and the hazard of flooding are the main limitations. These soils are poorly suited to use as sites for dwellings and small commercial buildings. The hazard of flooding is the main limitation for this use.

8. Dundee

Level to gently undulating, somewhat poorly drained soils that are loamy throughout and have an acid subsoil; formed in Mississippi River alluvium

This map unit consists of soils in high positions on natural levees of old distributary channels of the Mississippi River. Unprotected areas of these soils are subject to rare flooding in winter, spring, and early in summer. Slopes range from 0 to 3 percent.

This map unit makes up about 7 percent of the parish. It is about 91 percent Dundee soils and 9 percent soils of minor extent.

The Dundee soils have a surface layer of very dark grayish brown, slightly acid silt loam or silty clay loam. The subsoil is dark grayish brown and grayish brown, medium acid and strongly acid silty clay loam and loam.

Of minor extent are the somewhat poorly drained Tensas soils, the poorly drained Sharkey soils, and the very poorly drained Fausse soils. All of these soils are in low positions on alluvial plains.

Most of the soils in this map unit have been cleared and are used for crops, mainly soybeans. Cotton, corn, wheat, and grain sorghum are also grown. The remaining acreage is in mixed hardwoods and is used for timber production and as habitat for wildlife.

The soils in this map unit are well suited to crops and pasture. The loamy surface layer and medium fertility favor these uses. Wetness is the main limitation. A surface drainage system is needed for crop production.

The soils in this map unit are well suited to southern hardwood production. The dominant trees are cherrybark oak, water oak, eastern cottonwood, sweetgum, and pecan. Wetness moderately limits the use of equipment.

The soils in this map unit are poorly suited to sanitary facilities and moderately well suited to building site development. Wetness, moderately slow permeability, and moderate shrink-swell potential are the main limitations for these uses.

9. Hebert-Perry

Level to gently undulating, somewhat poorly drained and poorly drained soils that are loamy and clayey throughout and have an acid subsoil; formed in Ouachita and Arkansas River alluvium

This map unit consists of soils in broad, level areas and in gently undulating areas on alluvial plains of the Ouachita River and former channels of the Arkansas River. The soils in this map unit are subject to rare flooding. Slopes range from 0 to 3 percent.

This map unit makes up about 7 percent of the parish. It is about 70 percent Hebert soils, 18 percent Perry soils, and 12 percent soils of minor extent.

The somewhat poorly drained Hebert soils are in intermediate positions on natural levees. The surface layer is dark brown, medium acid silt loam or silty clay loam. The subsoil is very strongly acid silty clay loam and loam. It is grayish brown in the upper part and reddish brown in the lower part.

The poorly drained Perry soils are in low positions on natural levees. The surface layer is grayish brown silty clay loam or dark grayish brown clay. The subsoil is gray, strongly acid clay in the upper part and dark reddish gray, slightly acid clay in the lower part.

Of minor extent are the well drained Sterlington and Rilla soils in high positions on natural levees.

Most of the soils in this map unit have been cleared and are used for crops, mainly soybeans. Cotton, corn, wheat, and grain sorghum are also grown. The remaining acreage is in mixed hardwoods and is used for timber production and as habitat for wildlife.

The soils in this map unit are well suited to crops and pasture. Wetness and poor tilth are the main limitations. A surface drainage system and fertilizer are needed for crop production.

The soils in this map unit are well suited to southern hardwood production. The dominant trees are cherrybark oak, Nuttall oak, water oak, eastern cottonwood, American sycamore, pecan, and sweetgum. Wetness is a moderate to severe limitation for the use of equipment.

The soils in this map unit are poorly suited to sanitary facilities and building site development. Wetness and the hazard of flooding are the main limitations.

Soils That are Loamy Throughout; on Stream Terraces

This group of map units consists of well drained, somewhat poorly drained, and poorly drained soils that are loamy throughout. The two map units in this group make up about 9 percent of the parish. Most of the acreage is used as cropland. Pastureland and woodland areas commonly are small and scattered. Susceptibility to erosion and wetness are the main limitations for most uses.

10. Calloway-Calhoun-Memphis

Level to strongly sloping, somewhat poorly drained, poorly drained, and well drained soils that are loamy throughout; formed in loess

This map unit consists of soils on low knolls and ridges, in narrow drainageways, and on convex slopes on low and high stream terraces. The area of soils on the low stream terrace between Harrisonburg and Jonesville is subject to rare flooding. Slopes range from 0 to 12 percent.

This map unit makes up about 5 percent of the parish. It is about 46 percent Calloway soils, 26 percent Calhoun soils, 15 percent Memphis soils, and 13 percent soils of minor extent.

The nearly level, somewhat poorly drained Calloway soils are on low knolls and ridges. The surface layer is brown silt loam. The subsoil is yellowish brown silt loam. The lower part of the subsoil is a fragipan of brown silty clay loam.

The level, poorly drained Calhoun soils are on broad flats, in depressional areas, and in narrow drainageways. The surface layer is grayish brown silt loam. The subsurface layer is light brownish gray and grayish brown silt loam. The subsoil is grayish brown silt loam and silty clay loam.

The nearly level to strongly sloping, well drained Memphis soils are on ridgetops and convex side slopes.

The surface layer is dark grayish brown silt loam. The subsoil is dark brown silty clay loam and silt loam.

Of minor extent are the moderately well drained Loring soils on low ridges and knolls.

Most of the soils in this map unit are used for crops and pasture. Cotton and soybeans are the main crops. Corn, grain sorghum, and wheat are also grown. A few remaining uncleared areas of these soils along drainageways are generally in mixed hardwoods.

The soils in this map unit are moderately well suited to crops and well suited to pasture. Wetness is the main limitation for these uses in level areas, and erosion is a hazard in sloping areas. A drainage system is needed for crops and pasture in level areas. In sloping areas, soil losses from erosion can be minimized by minimum tillage, contour farming, and grassed waterways.

The soils in this map unit are well suited to woodland. The potential production of loblolly pine is moderately high to very high. The dominant native trees are water oak, Nuttall oak, cherrybark oak, and sweetgum. Wetness limits equipment use and causes moderate seedling mortality in the level areas.

The soils in this map unit are poorly suited to sanitary facilities and building site development. Wetness and the hazard of flooding are the main limitations in areas of Calhoun and Calloway soils. Slope is a limitation of Memphis soils.

11. Bursley-Calhoun

Nearly level and level, poorly drained soils that are loamy throughout; formed in loess, alluvium and old stream deposits

This map unit consists of nearly level and level soils on low knolls and ridges, broad flats, and in narrow drainageways on low stream terraces. Most areas of these soils are subject to rare flooding. Slopes range from 0 to 2 percent.

This map unit makes up about 4 percent of the parish. It is about 62 percent Bursley soils, 21 percent Calhoun soils, and 17 percent soils of minor extent.

The nearly level Bursley soils are on low knolls and ridges. The surface layer is dark brown silt loam or silty clay loam. The subsoil is mottled silty clay loam. It is grayish brown and yellowish brown in the upper and middle parts and brown in the lower part.

The level Calhoun soils are on broad flats and in narrow drainageways. The surface layer is grayish brown silt loam. The subsurface layer is light brownish gray and grayish brown silt loam. The subsoil is grayish brown, mottled silty clay loam.

Of minor extent are the somewhat poorly drained Necessity soils on slightly higher ridges and side slopes than Bursley and Calhoun soils and the poorly drained Forestdale soils in low areas along drainageways.

Most of the soils in this map unit are used for crops. A small acreage is in pasture and woodland. Soybeans is the main crop. Cotton and grain sorghum are also grown.

The soils in this map unit are moderately well suited to crops and well suited to pasture. Wetness is the main limitation for these uses. A drainage system and fertilizer are needed for crops and pasture.

The soils in this map unit are moderately well suited to woodland. The dominant trees are water oak, Nuttall oak, swamp chestnut oak, sweetgum, loblolly pine, and cedar elm. Wetness limits the use of equipment and causes moderate seedling mortality.

The soils in this map unit are poorly suited to sanitary facilities and building site development. Wetness and the hazard of flooding are the main limitations for these uses.

Soils That are Loamy or Clayey; on Uplands

This group of map units consists of moderately well drained and well drained loamy and clayey soils. The three map units in this group make up about 17 percent of the parish. Most of the acreage is in woodland. Steepness of slope is the main limitation for most uses. The texture given in the descriptive headings of these map units refers to the texture of the surface layer of the major soils in each map unit.

12. Providence-Oula-Smithdale

Gently sloping to steep, moderately well drained and well drained, loamy and clayey soils; formed in loess and old stream or marine deposits

This map unit consists of soils on gently sloping to strongly sloping, narrow ridgetops and moderately sloping to steep side slopes. Drainage is provided by small, deeply incised streams. Slopes range from 1 to 12 percent on ridgetops and from 5 to 40 percent on side slopes.

This map unit makes up about 6 percent of the parish. It is about 37 percent Providence soils, 19 percent Oula soils, 17 percent Smithdale soils, and 27 percent soils of minor extent.

The gently sloping to strongly sloping Providence soils are on ridgetops. These soils are moderately well drained and have a fragipan. The surface layer is dark gray silt loam. The subsoil is strong brown and yellowish red silty clay loam and silt loam in the upper part. The lower part is a fragipan of strong brown and dark yellowish brown silt loam and loam.

The moderately steep and steep Oula soils are on side slopes. These well drained soils have a surface layer of dark grayish brown very fine sandy loam or silt loam, or they have a surface layer of very dark grayish brown silty clay. The subsoil is light brownish gray and grayish brown clay. The underlying material is light olive brown loam and sandy clay loam.

The moderately sloping to steep Smithdale soils are on ridgetops and side slopes. These well drained soils have a surface layer of brown fine sandy loam. The

subsoil is red and yellowish red sandy clay loam and sandy loam.

Of minor extent are the well drained Kisatchie and Lucy soils on some of the side slopes. Also included are the poorly drained Guyton soils on flood plains of narrow streams.

Most of the soils in this map unit are used for pine and mixed hardwoods and are intensively managed for timber production. A small acreage is in pastureland or is used for homesites.

The soils in this map unit are moderately well suited to woodland. Susceptibility to erosion on skid trails and loading areas is the main limitation. Steep slopes and gullies limit the use of equipment in some areas.

The soils in this map unit are poorly suited to crops and improved pasture. Slope is generally too steep and the hazard of erosion is too severe for these uses. Small areas on less sloping ridgetops are suitable for pastureland and cropland.

The soils in this map unit are poorly suited to sanitary facilities and buildings. Steep slopes are the main limitations.

The soils in this map unit have good potential for the development of habitat for woodland wildlife.

13. Smithdale-Oula-Sweatman

Moderately sloping to steep, well drained, loamy and clayey soils; formed in old stream or marine deposits

This map unit consists of soils on moderately sloping and strongly sloping, very narrow ridgetops and moderately steep to steep side slopes. Drainage is provided by small, deeply incised streams. Slopes range from 5 to 40 percent.

This map unit makes up about 8 percent of the parish. It is about 33 percent Smithdale soils, 18 percent Oula soils, 15 percent Sweatman soils, and 34 percent soils of minor extent.

The Smithdale soils are on moderately steep and steep side slopes and on some moderately sloping and strongly sloping ridgetops. The surface layer is brown fine sandy loam. The subsoil is red and yellowish red sandy clay loam and sandy loam.

The Oula soils are mainly on moderately steep and steep side slopes. The surface layer is dark grayish brown very fine sandy loam. The subsoil is light brownish gray and grayish brown clay. The underlying material is light olive brown loam and sandy clay loam.

The Sweatman soils are on moderately steep and steep side slopes. The surface layer is very dark grayish brown fine sandy loam. The subsoil is yellowish red and reddish brown clay and silty clay. The underlying material is stratified light yellowish brown shaly clay and brownish yellow very fine sandy loam.

Of minor extent are the Alaga, Bayoudan, Guyton, Kisatchie, Lucy, and Providence soils. Of the soils of minor extent, Providence soils are dominant and make up about 14 percent of this map unit. They are on ridgetops, are moderately well drained, and have a fragipan. Guyton soils are poorly drained and are on narrow flood plains of small streams. Alaga, Bayoudan, Kisatchie, and Lucy soils are well drained and are on moderately steep and steep side slopes.

Most of the soils in this map unit are used for pine and mixed hardwoods and are intensely managed for timber production.

The soils in this map unit are moderately well suited to woodland. Equipment use limitations because of steepness of slope are severe. Many areas of these soils are not suited to mechanical tree planting because of steepness of slope. These areas need to be seeded aerially or planted by hand. The susceptibility to soil erosion on skid trails, loading areas, and logging roads is moderate to high.

The soils in this map unit are poorly suited to cropland, pastureland, sanitary facilities, or buildings. Steepness of slope is the main limitation.

The soils in this map unit have good potential for the development of habitat for woodland wildlife.

14. Memphis-Smithdale

Moderately sloping to steep, well drained, loamy soils; formed in loess and old stream deposits

This map unit consists of soils on moderately sloping and strongly sloping, very narrow ridgetops and moderately steep and steep side slopes. Drainage is provided by small, deeply incised streams. Slopes range from 5 to 40 percent.

This map unit makes up about 3 percent of the parish. It is about 42 percent Memphis soils, 20 percent Smithdale soils, and 38 percent soils of minor extent.

The moderately sloping to moderately steep Memphis soils are on ridgetops and upper side slopes. The surface layer is dark grayish brown silt loam. The subsoil is dark brown silty clay loam and silt loam.

The Smithdale soils are mainly on moderately steep and steep side slopes. They are on some moderately sloping and strongly sloping ridgetops. The surface layer is brown fine sandy loam. The subsoil is red and yellowish red sandy clay loam and sandy loam.

Of minor extent are the well drained Kisatchie and Oula soils on side slopes and the poorly drained Guyton soils on narrow flood plains of small streams.

Most of the soils in this map unit are used as woodland, mainly pine and mixed hardwoods, and are intensively managed for timber production. Some of the soils are in the Sicily Island Wildlife Management area and are managed for use as habitat for woodland wildlife. A few small areas are mined for gravel, sand, and loamy fill material.

The soils in this map unit are moderately well suited to woodland. Because of steepness of slopes, these soils have severe equipment use limitations. Some areas are not suited to mechanical planting and need to be seeded

aerially or planted by hand. The susceptibility to soil erosion on skid trails, loading areas, and logging roads is moderate.

These soils are poorly suited to cropland, pastureland, sanitary facilities, or building site development. Slopes are generally too steep for these uses.

The soils in this map unit have good potential for the development of habitat for woodland wildlife.

Broad Land Use Considerations

The soils in Catahoula Parish vary widely in their suitability for major land uses. About 54 percent of the land is used for cultivated crops, mainly soybeans. The cropland is scattered throughout the parish. It is a major land use in all general soil map units except map units 4, 12, 13, and 14. These map units are mainly in woodland.

The most highly productive soils are in general soil map units 7, 8, and 9. The main soils in these map units are in the Dundee, Hebert, Norwood, Perry, and Roxana series. These soils are mostly loamy, have high or medium fertility, and are well suited to most crops. The Perry soils are moderately well suited to most crops. Wetness is the main limitation for growing crops. Poor tilth is also a limitation of the Perry soils.

Soils in general soil map units 5, 6, 10, and 11 are moderately well suited to crops. The main soils in these map units are in the Alligator, Bursley, Calhoun, Calloway, Dundee, Memphis, Sharkey, and Tensas series. Wetness and poor tilth are the main limitations for soils in map units 5 and 6. Soils in map units 10 and 11 are on stream terraces. These soils have medium or low fertility. Wetness is the main limitation and erosion is the main hazard for crops in map units 10 and 11.

Soils in general soil map units 1, 2, and 3 are somewhat poorly suited to crops. The main soils in these map units are in the Alligator, Perry, Sharkey, and Tensas series. Poor tilth, wetness, and the hazard of flooding are the main limitations for growing crops.

About 50,000 acres, or about 11 percent of the land in the parish, is used for pasture. The soils in general soil map units 6, 7, 8, 9, 10, and 11 are well suited to pasture. The soils in map unit 5 are moderately well suited to pasture. Seasonal wetness is the main limitation. Soils in map units 1, 2, 3, and 4 are somewhat poorly suited to pasture. Wetness and the hazard of flooding are the main limitations. Soils in map units 12, 13, and 14 are poorly suited to pasture. Steepness of slope and the hazard of erosion are the main limitations.

About 30 percent of the land in the parish is in woodland. Soils in general soil map units 4, 12, 13, and 14 are used almost exclusively for timber production. Steepness of slope is the main limitation for soils in map units 12, 13, and 14. Wetness and the hazard of flooding are the main limitations in map unit 4. Equipment use limitations caused by wetness are the main limitations for woodland production in the other map units in the parish.

About 2,000 acres in the parish is urban or built-up areas. The main soils in all of the map units have severe limitations for one or more urban uses and are generally poorly suited to urban development. Wetness and the hazard of flooding are the main limitations for urban use in map units 1 through 11. Steepness of slope is the main soil limitation in map units 12, 13, and 14.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Sharkey clay is one of several phases in the Sharkey series.

Some map units are made up of two or more major soils. These map units are called soil complexes or soil associations.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Tensas-Alligator complex, undulating, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Alaga-Smithdale-Lucy association, 5 to 40 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, gravel, is an example. Miscellaneous areas are shown on the soil maps.

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

The boundaries of map units in Catahoula Parish were matched, where possible, with those of the previously completed surveys of Avoyelles, Concordia, Franklin, and Tensas Parishes. In a few places, the lines do not join and there are differences in the names of the map units. These differences result mainly from changes in soil series concepts, differences in map unit design, and changes in soil patterns near survey area boundaries.

All of the soils in Catahoula Parish were mapped at the same level of detail except for those steeply sloping soils on uplands and those areas of spoil material on the flood plain of the Red River. Steepness of slope limits the use and management of the soils, and separating all of the soils in these steeply sloping areas would be of little importance to the land user. The spoil areas consists of material that was deposited during construction activities. This material was so variable that it was not practical to separate all of the soils in these areas.

AA—Alaga-Smithdale-Lucy association, 5 to 40 percent slopes. The somewhat excessively drained Alaga soils and the well drained Lucy and Smithdale soils are on uplands. The landscape is narrow, moderately sloping to strongly sloping ridgetops and moderately steep to steep side slopes. It is dissected by many narrow drainageways. Eroded spots, gullies, and

outcrops of sandstone are in some areas. The mapped areas are large and are about 26 percent Alaga soils, 15 percent Smithdale soils, and 13 percent Lucy soils.

Alaga soils are on middle and lower side slopes that range from 5 to 25 percent. Lucy and Smithdale soils are on ridgetops and upper side slopes. Slopes on ridgetops range from 5 to 12 percent, and the upper side slopes range from 12 to 40 percent.

Fewer observations were made in this map unit than in other areas because the steep slopes are a major limitation to the use and management of these soils. For this reason, separation of the soils would be of little value to the land user. The detail in mapping, however, is adequate for the expected use of these soils.

Typically, the Alaga soil has a surface layer of dark grayish brown, medium acid loamy sand about 4 inches thick. The underlying material to a depth of about 92 inches is light yellowish brown, brown, and yellowish brown, very strongly acid and strongly acid loamy sand. In places the underlying material is very pale brown in the lower part.

Water and air move through this soil rapidly. Runoff is slow, and the hazard of water erosion is moderate. This soil is low in fertility. It has low available water capacity. The shrink-swell potential is low.

Typically, the Smithdale soil has a surface layer of dark grayish brown, strongly acid fine sandy loam about 3 inches thick. The subsurface layer is pale brown, strongly acid fine sandy loam to a depth of about 11 inches. The subsoil is red, very strongly acid sandy clay loam to a depth of about 70 inches.

Water and air move through this soil at a moderate rate. Runoff is rapid, and the hazard of water erosion is severe. This soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. It has low shrink-swell potential.

Typically, the Lucy soil has a surface layer of very dark grayish brown, medium acid loamy fine sand about 4 inches thick. The subsurface layer is pale brown, strongly acid loamy fine sand to a depth of about 30 inches. The subsoil to a depth of about 62 inches is red, very strongly acid and strongly acid sandy clay loam.

Water and air move through this soil at a moderately rapid rate in the upper part and moderate rate in the lower part. Runoff is slow, and the hazard of water erosion is moderate. This soil has low fertility and high levels of exchangeable aluminum that are potentially toxic to some plants. It has low to moderate available water capacity. The shrink-swell potential is low.

Included with these soils in mapping are many small to large areas of Providence soils on ridgetops and Oula soils on side slopes. The Providence and Oula soils each make up about 10 percent of the map unit. Providence soils are silty in the upper part and have a fragipan. Oula soils have a clay subsoil. Also included are a few small areas of Guyton and Sweatman soils. Guyton soils are in drainageways and are silty and gray throughout. Sweatman soils are on some of the side slopes and have a clay subsoil. Included in some drainageways are small areas of soils that are similar to Guyton soils except that they do not have a seasonal high water table. Included on some ridgetops and upper side slopes are small areas of soils that are similar to Providence soils except that they have a thinner surface layer and subsoil overlying the fragipan. Also included on some foot slopes are small areas of soils that are similar to Smithdale soil except that they have a subsoil that is buried under recently deposited, loamy sediment that ranges in thickness from 40 to 80 inches. The included soils make up about 46 percent of the map unit.

Most of the acreage of the soils in this map unit is used as woodland and habitat for upland wildlife. It is mainly in pine trees, but some areas are in mixed hardwood and pine stands. A small acreage is used for homesites.

The soils in this map unit are moderately well suited to woodland. It has moderately high to high potential for the production of loblolly pine. The main concerns in producing and harvesting timber are steepness of slope, moderately high seedling mortality because of soil droughtiness, and minimizing the risk of erosion. Steepness of slope limits the kinds of equipment that can be used in forest management. Poor traction with logging equipment is a problem on sandy soils. Reforestation after harvesting needs to be carefully managed to reduce competition from undesirable understory plants.

These soils produce habitat for deer, turkey, squirrel, and other native upland wildlife. Habitat for wildlife can be improved by leaving mast-producing trees, such as beech, hickory, and oak, along drainageways when harvesting timber and during site preparation for tree planting.

The soils in this map unit are poorly suited to homesites, urban development, recreational development, cropland, and pastureland. The main limitation is steepness of slope. The Alaga soil is suitable as a source of sand for construction uses.

The Alaga soil is in capability subclass VIIs and in woodland group 3s. The Smithdale soil is in capability subclass VIIe and in woodland group 2r. The Lucy soil is in capability subclass VIs and in woodland group 3s.

Ag—Alligator clay, occasionally flooded. This level, poorly drained soil is in low positions on alluvial plains of the Ouachita, Black, and Tensas Rivers and other former channels and distributaries of the Arkansas and Mississippi Rivers. The mapped areas are irregular in shape and range from 20 to 1,000 acres. Slope is less than 1 percent.

Typically, the surface layer is dark gray, strongly acid clay about 4 inches thick. The subsoil is gray, mottled clay to a depth of 49 inches. It is very strongly acid in the upper part and strongly acid in the lower part. The

underlying material to a depth of about 60 inches is gray, mottled, neutral clay.

Included with this soil in mapping are a few small areas of Fausse, Forestdale, Perry, Sharkey, and Tensas soils. Fausse soils are in lower positions than Alligator soil and remain so wet throughout the year that they do not dry and crack as deeply as the Alligator soil. Forestdale soils are in higher positions and contain less clay in the subsoil than Alligator soil. Perry and Sharkey soils are in positions similar to those of Alligator soil. Perry soils have a reddish brown subsoil, and Sharkey soils are more alkaline in the subsoil. Tensas soils are in slightly higher positions than Alligator soil and are loamy in the lower part of the subsoil. Also included in places are small areas of Alligator soils that are subject to frequent flooding or that flood only rarely. The included soils make up about 15 percent of the map unit.

Water and air move through this Alligator soil very slowly. Water runs off the surface very slowly. This soil has medium fertility. Adequate water is available to plants in most years. A seasonal high water table is about 1/2 foot to 2 feet below the surface during January through April. This soil dries slowly after heavy rains. It has very high shrink-swell potential. This soil is subject to flooding for periods of 60 days or longer during January through July. Flooding occurs less often than 2 years out of 5 during the cropping season and more often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 5 feet deep, and the depth exceeds 10 feet in places.

Most of the acreage of this soil is in cropland. A small acreage is in woodland or pastureland, or it is used for homesites.

This soil is somewhat poorly suited to cultivated crops. It is limited mainly by wetness, flooding, and poor tilth. The main crops are soybeans and grain sorghum. A drainage system is needed for most cultivated crops and pasture plants. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Flooding can be controlled by levees, channels, and pumps. In flood years, water generally recedes in time to plant a short-season crop. Reduced yields as a result of late planting are common.

This soil is moderately well suited to woodland. It has high potential for the production of hardwood trees, such as eastern cottonwood, American sycamore, sweetgum, and water oak. However, flooding, wetness, and moderately high seedling mortality are concerns in producing and harvesting timber. Wetness and the clayey texture of the surface layer limit the use of equipment. Only trees that can tolerate seasonal wetness should be planted. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is somewhat poorly suited to pasture. The main limitations are wetness and the hazard of flooding. The main suitable pasture plant is common bermudagrass. Excessive water on the surface can be removed by shallow ditches. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is poorly suited to urban use. It is not suited to homesites. It has severe limitations for building sites, local roads and streets, most sanitary facilities, and most recreational uses. The main limitations are wetness, low strength for roads, very slow permeability, the very high shrink-swell potential, and the hazard of flooding. Major flood control structures and local drainage systems are needed.

This Alligator soil is in capability subclass IVw and in woodland group 2w.

At—Alligator clay, frequently flooded. This level, poorly drained soil is in low positions on alluvial plains of the Ouachita, Tensas, and Black Rivers and other former channels and distributaries of the Arkansas and Mississippi Rivers. The mapped areas are irregular in shape and range from 40 to 1,000 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is gray, strongly acid clay about 5 inches thick. The subsoil is gray, mottled, strongly acid clay. The underlying material to a depth of about 60 inches is gray, mottled, slightly acid clay.

Included with this soil in mapping are a few small areas of Fausse, Perry, and Sharkey soils. Fausse soils are in slightly lower positions than Alligator soil and remain so wet throughout the year that they do not crack as deeply as the Alligator soil. Perry soils are in slightly higher positions than Alligator soil and have a reddish brown subsoil. Sharkey soils are in positions similar to those of the Alligator soil and are more alkaline in the subsoil. Also included in places are small areas of Alligator soils that are subject to only occasional flooding. The included soils make up about 15 percent of the map unit.

Water and air move through this Alligator soil very slowly. Water runs off the surface very slowly. This soil is medium in fertility. A seasonal high water table is about 1/2 foot to 2 feet below the surface during January through April. This soil has very high shrink-swell potential. It is subject to flooding in January through July. Flooding occurs more often than 2 years out of 5 on a yearly basis and during the cropping season. Flood waters typically are 1 foot to 5 feet deep, and the depth

exceeds 15 feet in places. Flood duration can exceed 90 days.

Most of the acreage of this soil is used as cropland. A small acreage is in woodland.

This soil is poorly suited to cultivated crops and pasture. It is limited mainly by flooding, wetness, and poor tilth. The main crops are soybeans and grain sorghum, and the main suitable pasture plant is common bermudagrass. Flooding can be controlled by levees, channels, and pumps. A drainage system is needed for most cultivated crops and pasture plants. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Most crops and pasture plants respond well to fertilizer. Lime is generally needed. Reduced crop production as a result of late planting is common. In many years, flood waters do not recede in time to plant a short-season crop. In other years, crops are damaged by flooding in summer. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is moderately well suited to woodland. It has moderately high potential for the production of eastern cottonwood, green ash, sweetgum, and American sycamore. The main concerns in producing and harvesting timber are flooding, wetness, and moderately high seedling mortality. Wetness and the clayey texture of the surface layer limit the use of equipment. Only trees that can tolerate seasonal wetness should be planted. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to May.

This soil is not suited to most urban uses or to recreational development. The hazard of flooding is generally too severe for these uses.

This Alligator soil is in capability subclass Vw and in woodland group 3w.

Ba—Bayoudan clay, 5 to 40 percent slopes. This moderately well drained soil is on uplands. The landscape is narrow, moderately sloping to strongly sloping ridgetops and moderately steep to steep side slopes. It is dissected by many small drainageways. Eroded spots and shallow to deep gullies are in some areas. Landslides are common in areas of this soil. The mapped areas typically are several hundred acres.

Typically, the surface layer is dark grayish brown, very strongly acid clay about 2 inches thick. The subsoil is mottled, extremely acid clay to a depth of about 34 inches. It is yellowish red in the upper part, yellowish brown in the middle part, and pale olive in the lower part. The underlying material to a depth of about 63 inches is stratified light olive brown and yellowish brown, very strongly acid to mildly alkaline clay. In places, the surface layer is silty clay or silty clay loam.

Included in this map unit are a few small areas of Smithdale and Sweatman soils. These soils are in higher parts of the landscape than Bayoudan soil. Smithdale soils are loamy throughout. Sweatman soils contain slightly less clay in the subsoil. Also included are small areas of soils that are similar to Bayoudan soil except that they contain lime concretions in the subsoil. Small areas of Bayoudan soils are included that have slopes of more than 40 percent. The included soils make up about 15 percent of the map unit.

Water and air move through this Bayoudan soil very slowly. Runoff is medium to very rapid, and the hazard of water erosion is very severe. This soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. The soil swells and shrinks markedly upon wetting and drying.

All of the acreage of this soil is in woodland. It is mainly in pine trees, but some areas are in mixed hardwood and pine stands.

This soil is moderately well suited to woodland. It has moderate potential for the production of loblolly pine. The main concern in producing and harvesting timber is steepness of slope. Steepness of slope limits the kinds of equipment that can be used in forest management. Trees need to be planted by hand or seeded aerially. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Leaning and deformed trees caused by landslides and the shrinking and swelling of this soil are common. Trees commonly are subject to windthrow during periods when the soil is excessively wet and winds are strong.

This soil produces habitat for deer, turkey, squirrel, and other native woodland wildlife. Habitat for wildlife can be improved by leaving mast-producing trees along drainageways when harvesting timber and preparing sites for tree planting.

This soil is poorly suited to most urban and recreation uses, cropland, and pastureland. The main limitations are steepness of slope and very high shrink-swell potential. Homes and roads or streets can be damaged when large areas of this soil, saturated by rain water, break free and slide downslope (fig. 1).

This Bayoudan soil is in capability subclass VIIe and in woodland group 4c.

Br—Bursley silt loam, rarely flooded. This nearly level, poorly drained soil is on low ridges and knolls of the Wallace Ridge, a loess and alluvium mantled, low stream terrace. The mapped areas are irregular in shape and range from 10 to several hundred acres. Slopes are long and smooth and range from 0 to 2 percent.

Typically, the surface layer is yellowish brown, strongly acid silt loam about 4 inches thick. The upper part of the subsoil is grayish brown, mottled, very strongly acid silt loam. The lower part of the subsoil and the underlying material to a depth of about 64 inches are yellowish brown, mottled, medium acid silty clay loam.

Included with this soil in mapping are a few small areas of Forestdale and Necessity soils. The Forestdale

Figure 1.—Soil slippage is a severe limitation to local roads and streets in this area of Bayoudan clay, 5 to 40 percent slopes.

soils are in lower positions than Bursley soil and contain more clay in the subsoil. The Necessity soils are in higher positions than Bursley soil and have a fragipan. Also included are small areas of Bursley soils that have slopes of 2 to 4 percent and Bursley soils that are protected from flooding by levees. The included soils make up about 15 percent of the map unit.

Water and air move through this Bursley soil moderately slowly. Adequate water is available to plants in most years. Water runs off the surface slowly. A seasonal high water table is about 1/2 foot to 3 feet below the surface during December through June. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 30 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is in woodland or pastureland, or is used for homesites.

This soil is moderately well suited to cultivated crops. It is limited mainly by wetness. Suitable crops are soybeans, cotton, grain sorghum, corn, wheat, and truck crops. Soybeans is the main crop. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Crops respond well to lime and fertilizer, which help to overcome the medium fertility and reduce the moderately high levels of exchangeable aluminum. Early fall seeding, minimum tillage, and grassed waterways help to control erosion. When rare

flooding occurs, waters generally recede in time to plant a short-season crop.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are improved bermudagrass, common bermudagrass, Pensacola bahiagrass, ryegrass, white clover, and southern winter peas. Excessive water on the surface can be removed by a surface drainage system. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is moderately well suited to woodland. It has moderately high potential for the production of hardwoods, such as American sycamore, water oak, Nuttall oak, and sweetgum. The main concern in producing and harvesting timber is wetness. Wetness limits the use of equipment. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is poorly suited to use for homesites, most sanitary facilities, and most other urban and recreation uses. The main limitations are wetness, low strength for roads, and the hazard of flooding. Major flood control structures and local drainage systems are needed. Homes can be built on properly designed mounds of soil material above expected flood elevations; however, access may be restricted during periods of high water. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and the slow permeability of this soil, septic tank absorption fields do not function properly during rainy periods.

This Bursley soil is in capability subclass IIIw and in woodland group 3w.

Bs—Bursley silty clay loam, rarely flooded. This nearly level, poorly drained soil is on low ridges and knolls of Wallace Ridge, an alluvium and loess mantled, low stream terrace. The mapped areas are irregular in shape and range from 10 to 300 acres. Slopes are long and smooth and range from 0 to 2 percent.

Typically, the surface layer is dark brown, neutral silty clay loam about 4 inches thick. The subsoil is strongly acid or very strongly acid silty clay loam to a depth of 61 inches. It is grayish brown in the upper part, yellowish brown in the middle part, and yellowish brown, grayish brown, and brown in the lower part. The subsoil has mottles in shades of brown throughout. The underlying material to a depth of about 72 inches is brown, mottled, strongly acid loam.

Included with this soil in mapping are a few small areas of Forestdale and Necessity soils. Forestdale soils are in lower positions than Bursley soil and have a fine-textured subsoil. Necessity soils are in higher positions than Bursley soil and have a fragipan. Also included are small areas of Bursley soils that have slopes of 2 to 4 percent and Bursley soils that are protected from flooding. The included soils make up about 15 percent of the map unit.

Water and air move through this Bursley soil moderately slowly. Water runs off the surface slowly, and adequate water is available to plants in most years. A seasonal high water table fluctuates between about 1/2 foot and 3 feet below the surface during December through June. The surface layer of this soil remains wet for long periods after heavy rains. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 30 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is used as cropland. A small acreage is used as woodland, homesites, or pastureland.

This soil is moderately well suited to cultivated crops. It is limited mainly by wetness. Suitable crops are soybeans, cotton, corn, grain sorghum, wheat, and truck crops. Soybeans is the main crop. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Crops respond well to lime and fertilizer, which help to overcome the medium fertility and moderately high levels of exchangeable aluminum. Early fall seeding, minimum tillage, and construction of grassed waterways help to control erosion. When rare flooding occurs, water generally recedes in time to plant a short-season crop.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are improved bermudagrass, common bermudagrass, Pensacola bahiagrass, ryegrass, white clover, and southern winter peas. Excessive water on the surface can be removed by a surface drainage system. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is moderately well suited to woodland. It has moderately high potential for the production of hardwoods, such as American sycamore, water oak, Nuttall oak, and sweetgum. The main concern in

producing and harvesting timber is wetness. Wetness limits the use of equipment. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is poorly suited to homesites, most sanitary facilities, and most other urban and recreation uses. The main limitations are wetness, low strength for roads, and the hazard of flooding. Major flood control structures and local drainage systems are needed. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and the slow permeability of this soil, septic tank absorption fields do not function properly during rainy periods. Homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This soil is in capability subclass IIIw and in woodland group 3w.

Co—Calhoun silt loam. This level, poorly drained soil is in drainageways and on broad flats and in depressional areas on the Macon Ridge, a loess mantled, high stream terrace. The mapped areas are generally long and narrow and range from 5 to 150 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is strongly acid, grayish brown, silt loam about 5 inches thick. The subsurface layer is medium acid silt loam to a depth of about 20 inches. It is light brownish gray in the upper part and grayish brown in the lower part. The subsoil is grayish brown, medium acid silty clay loam and silt loam to a depth of 64 inches. The underlying material to a depth of about 80 inches is grayish brown, medium acid silt loam. This soil is mottled throughout in shades of brown.

Included with this soil in mapping are a few small areas of Calloway, Loring, and Memphis soils. These soils are in higher positions than those of the Calhoun soil. Calloway and Loring soils have a fragipan. Memphis soils have a browner subsoil. Also included are small areas of Calhoun soils that are subject to shallow flooding after heavy rains. In places, a few potholes and channel scars pond for long periods and support water-tolerant trees, such as baldcypress and tupelo gum. The included soils make up about 10 percent of the map unit.

Water and air move through this Calhoun soil slowly. This soil has medium fertility. Water runs off the surface slowly. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. The surface layer of this soil remains wet for long periods after heavy rains. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is in cropland. A small acreage is used as pastureland, woodland, or homesites.

This soil is moderately well suited to cultivated crops. Cotton, soybeans, and small grains are the main crops. It is limited mainly by wetness. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Most crops and pasture plants respond well to lime and fertilizer. Erosion can be reduced if fall grain is seeded early, minimum tillage or stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways need to be shaped and seeded to perennial grass.

This soil is well suited to pasture. The main limitation is wetness. Excessive water on the surface can be removed by shallow ditches and by providing the proper grade. The main suitable pasture plants are common bermudagrass, Pensacola bahiagrass, white clover, southern winter peas, and ryegrass. Grazing when the soil is wet results in compaction of the surface layer. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Proper grazing, weed control, and fertilizer are needed for maximum quality of forage. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is well suited to woodland. It has high potential for the production of water oak, sweetgum, and loblolly pine. However because of wetness, the use of equipment is limited and seedling mortality is generally moderately high. Reforestation after harvesting needs to be carefully managed to reduce competition from undesirable understory plants. Only trees that can tolerate seasonal wetness should be planted.

This soil is poorly suited to recreational development. It is limited mainly by wetness. Good drainage needs to be provided for most recreational uses.

This soil is poorly suited to urban development and homesites. The main limitations are wetness, slow permeability, and low strength for roads. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and the slow permeability of this soil, septic tank absorption fields do not function properly during rainy periods.

This Calhoun soil is in capability subclass IIIw and in woodland group 2w.

Cs—Calhoun silt loam, rarely flooded. This level, poorly drained soil is in drainageways, on broad flats, and in depressional areas on the Wallace Ridge, a loess mantled, low stream terrace. The mapped areas are generally long and narrow and range from 5 to 150 acres. Slope is less than 1 percent.

Typically, the surface layer is grayish brown, mottled, medium acid silt loam about 5 inches thick. The subsurface layer is grayish brown, mottled, silt loam about 16 inches thick. It is strongly acid in the upper part and very strongly acid in the lower part. The subsoil is grayish brown, mottled, very strongly acid silty clay loam. The underlying material to a depth of about 68 inches is grayish brown, mottled, very strongly acid silt loam.

Included with this soil in mapping are a few small areas of Calloway and Loring soils. Loring and Calloway soils are in higher positions than Calhoun soil and have a fragipan. Also included are small areas of Calhoun soils that are adjacent to drainageways and subject to shallow ponding for short periods following heavy rains. The included soils make up about 15 percent of the map unit.

Water and air move through this Calhoun soil slowly. This soil has medium fertility. Water runs off the surface slowly. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. The surface layer of this soil remains wet for long periods after heavy rains. Plants are damaged by lack of water during dry periods in summer and fall of some years. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis. Flood waters typically are 1 foot to 2 feet deep, and the depth exceeds 3 feet in places. Flood duration can exceed 30 days. The shrink-swell potential is moderate.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as pastureland, homesites, or woodland.

This soil is moderately well suited to cultivated crops. It is limited mainly by wetness. Cotton, soybeans, and grain sorghum are the main crops. This soil is friable and easy to keep in good tilth. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Most crops and pasture plants respond well to fertilizer. Lime is generally needed. In flood years, water generally recedes in time to plant a short-season crop. Erosion can be controlled if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways need to be shaped and seeded to perennial grass. Limiting tillage for seedbed preparation and weed control reduces runoff and controls erosion.

This soil is well suited to pasture. The main limitation is wetness. Excessive water on the surface can be removed by shallow ditches with the proper grade. The main suitable pasture plants are common bermudagrass, Pensacola bahiagrass, white clover, southern winter peas, and ryegrass. Grazing when the soil is wet results in compaction of the surface layer. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Proper grazing, weed control, and fertilizer and lime are needed for maximum quality of forage. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of water oak, sweetgum, and loblolly pine. The main concern in producing and harvesting timber is wetness. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April. Because of wetness of this soil, seedling mortality is moderately high. Only trees that can tolerate seasonal wetness should be planted.

This soil is poorly suited to recreational development. It is limited mainly by flooding and wetness. Good drainage is needed for most intensively used recreation areas. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Protection from flooding is needed.

This soil is poorly suited to local roads and streets and to homesites. The main limitations are wetness, slow permeability, low strength for roads, and the hazard of flooding. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and the slow permeability of this soil, septic tank absorption fields do not function properly during rainy periods. Flooding can be controlled by major flood control structures. Homes can be built on properly designed mounds of soil material so that they are above flood elevations. However, homes may be isolated by high water during periods of flooding.

This Calhoun soil is in capability subclass IIIw and in woodland group 2w.

Cw—Calloway silt loam. This nearly level, somewhat poorly drained soil is on low ridges and knolls of the Macon Ridge, a loess mantled, high stream terrace. The mapped areas are irregular in shape and range from 5 to 200 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown, very strongly acid silt loam about 7 inches thick. The subsoil is yellowish

brown and light gray, mottled, very strongly acid silt loam about 10 inches thick. The next layer is light gray, mottled, very strongly acid silt loam about 7 inches thick. Below that is a fragipan to a depth of about 60 inches. It is a brown, mottled, very strongly acid and strongly acid silty clay loam.

Included with this soil in mapping are a few small areas of Calhoun, Loring, and Memphis soils. The poorly drained Calhoun soils are in narrow drainageways and depressional areas and do not have a fragipan. The moderately well drained Loring soils and well drained Memphis soils are in higher positions than Calloway soil. Loring soils do not have gray mottles within a depth of 16 inches. Memphis soils do not have a fragipan. The included soils make up about 20 percent of the map unit.

Water and air move through this Calloway soil slowly. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. The high water table is perched above the fragipan about 1 foot to 2 feet below the surface during January through April. Water runs off the surface slowly. The surface layer of this soil remains wet for long periods after heavy rains. Plants are damaged by lack of water during dry periods in summer and fall of some years. The shrink-swell potential is moderate.

This soil is well suited to cultivated crops. It is limited mainly by wetness. Cotton, soybeans, corn, and small grains are the main crops. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. A tillage pan forms easily if this soil is tilled when wet. Chiseling or subsoiling can be used to break up the pan. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improves fertility and helps maintain soil tilth and content of organic matter. Most crops and pasture plants respond well to lime and fertilizer that are designed to overcome the medium fertility and reduce the levels of exchangeable aluminum in the root zone. Limiting tillage for seedbed preparation and weed control reduces runoff and helps control erosion. Diversions and grassed waterways may be needed.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are improved bermudagrass, common bermudagrass, Pensacola bahiagrass, ryegrass, tall fescue, and white clover. Grazing when the soil is wet results in compaction of the surface layer. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is well suited to woodland; but because it is also suited to cropland, most areas have been cleared for use as cropland or pastureland. This soil has moderately high potential for the production of water oak, sweetgum, and loblolly pine. The main concern in producing and harvesting timber is equipment use limitations caused by wetness. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is poorly suited to recreational development. The main limitations are wetness and slow permeability. Good drainage is needed for intensively used areas, such as playgrounds. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

This soil is poorly suited to urban development and homesites. The main limitations are wetness, slow permeability, and low strength for roads. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and the low permeability of this soil, septic tank absorption fields do not function properly during rainy periods. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage.

This Calloway soil is in capability subclass IIw and in woodland group 3w.

Cy—Calloway silt loam, rarely flooded. This nearly level, somewhat poorly drained soil is on low ridges and knolls on the Wallace Ridge, a loess mantled, low stream terrace. The mapped areas are irregular in shape and range from 5 to 200 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown, medium acid silt loam about 5 inches thick. The subsurface layer is brown, mottled, very strongly acid silt loam about 5 inches thick. The next layer, to a depth of about 19 inches, is yellowish brown and light brownish gray, mottled, very strongly acid silt loam. The next layer, to a depth of about 29 inches, is light gray, mottled, very strongly acid silt loam. The next layer is a compact and brittle fragipan. It is light gray and brown, mottled, very strongly acid silt loam in the upper part and brown and yellowish brown, mottled, very strongly acid silt loam in the lower part. The next layer to a depth of about 64 inches is strong brown, mottled, very strongly acid silt loam.

Included with this soil in mapping are a few small areas of Calhoun, Loring, and Memphis soils. The poorly drained Calhoun soils are in narrow drainageways and depressional areas and do not have a fragipan. The moderately well drained Loring soils and the well drained Memphis soils are in higher positions than Calloway soil. Loring soils do not have gray mottles within a depth of 16 inches, and Memphis soils do not have a fragipan.

The included soils make up about 20 percent of the map unit.

Water and air move through this Calloway soil slowly. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. The high water table is perched above the fragipan during January through April of most years. Water runs off the surface slowly. The surface layer of this soil remains wet for long periods after heavy rains. Plants are damaged by lack of water during dry periods in summer and fall of some years. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis. Flood waters typically are 1 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 30 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as pastureland, homesites, or woodland.

This soil is well suited to cultivated crops. It is limited mainly by wetness. Cotton, soybeans, corn, and small grains are the main crops. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Lime and fertilizer are needed to overcome the medium fertility and potentially toxic levels of exchangeable aluminum within the root zone. Erosion can be controlled if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways need to be shaped and seeded to perennial grass. Limiting tillage for seedbed preparation and weed control reduces runoff and helps control erosion. In flood years, water generally recedes in time to plant a short-season crop.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are common bermudagrass, improved bermudagrass, Pensacola bahiagrass, ryegrass, tall fescue, and white clover. Grazing when the soil is wet results in compaction of the surface layer. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Proper grazing, weed control, and lime and fertilizer are needed for maximum quality of forage. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland; but because it is also suited to cropland, most areas have been cleared for use as cropland or pastureland. It has moderately high potential for the production of water oak, sweetgum, and loblolly pine. The main concern in producing and harvesting timber is wetness. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to May. Only trees that can tolerate seasonal wetness should be planted.

This soil is poorly suited to recreational development. The main limitations are wetness, slow permeability, and the hazard of flooding. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Protection from flooding is needed.

This soil is poorly suited to homesites and urban development. The main limitations are wetness, slow permeability, low strength for roads, and the hazard of flooding. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by shallow ditches and by providing the proper grade. Preserving the existing plant cover during construction helps to control erosion. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and the slow permeability of this soil, septic tank absorption fields do not function properly during rainy periods. Flooding can be controlled by major flood control structures. Homes can be built on properly designed mounds of soil material above flood elevations; however, access can be restricted during periods of high water.

This Calhoun soil is in capability subclass IIw and in woodland group 3w.

De—Dundee silt loam, 0 to 1 percent slopes. This level, somewhat poorly drained soil is on natural levees of the Tensas and Black Rivers and other former channels and distributaries of the Mississippi River. Most areas of this soil are subject to rare flooding. The mapped areas are irregular in shape and range from 30 acres to several hundred acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is very dark grayish brown, slightly acid silt loam about 4 inches thick. The subsoil is dark grayish brown, mottled, medium acid silty clay loam in the upper part; grayish brown, mottled, strongly acid silty clay loam in the middle part; and grayish brown, mottled, medium acid loam in the lower part. The underlying material to a depth of about 60 inches is grayish brown, mottled, slightly acid, very fine sandy loam.

Included with this soil in mapping are a few small areas of Sharkey and Tensas soils. The Sharkey and Tensas soils are in lower positions than Dundee soil and have a fine-textured subsoil. Also included are a few small areas of soils similar to the Dundee soil except that they contain less clay in the subsoil. A few small to large areas of soils are included that are adequately protected from flooding by levees. The included soils make up about 10 percent of the map unit.

Water and air move through this Dundee soil moderately slowly. This soil has medium fertility. Water runs off the surface slowly. A seasonal high water table is at a depth of about 1-1/2 to 3-1/2 feet during January through April of most years. This soil dries quickly after rains. Plants are damaged by inadequate water during dry periods in summer and fall of most years. Areas not protected by levees are subject to rare flooding. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis. Flood waters typically are 1 foot to 3 feet deep but exceed 5 feet in places. Flood duration can exceed 30 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as pastureland, homesites, or woodland.

This soil is well suited to cultivated crops. It is limited mainly by wetness. Soybeans, cotton, corn, and small grains are the main crops. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Excessive cultivation can result in the formation of a plowpan. This pan can be broken by subsoiling when the soil is dry. Minimum tillage and crop residue returned to the soil or other organic matter regularly added improve fertility and help to maintain soil tilth and content of organic matter. Crops respond to lime and fertilizer. In flood years, water generally recedes in time to plant a short-season crop.

This soil is well suited to pasture. It is limited mainly by wetness. The main suitable pasture plants are improved bermudagrass, common bermudagrass, ryegrass, Pensacola bahiagrass, white clover, and tall fescue. Excess water can be removed by installing a surface drainage system. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Proper grazing, weed control, and fertilizer are needed for maximum quality of forage. During flood periods, cattle in unprotected areas need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of cherrybark oak, eastern cottonwood, sweetgum, and water oak. However, most areas have been cleared for use as cropland or pasture. Wetness limits the use of equipment. Trees should be water tolerant, and they need to be planted or harvested during dry periods.

This soil is moderately well suited to recreational development. It is limited mainly by flooding and wetness. Drainage is needed for intensively used areas, such as playgrounds and picnic areas.

Unless protected from flooding, this soil is poorly suited to urban development or for use as homesites. The main limitations are wetness, low strength for roads, moderate shrink-swell potential, and the hazard of flooding. In protected areas, this soil is moderately well suited to urban use. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Moderately slow permeability and the high water table are limitations for septic tank absorption fields. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with material that has low shrink-swell potential. Major flood control structures and local drainage systems are needed. In unprotected areas of this soil, homes or small buildings can be built on properly designed mounds of soil material above flood elevations; however, access can be restricted during periods of high water (fig. 2).

This Dundee soil is in capability subclass IIw and in woodland group 2w.

Dh—Dundee silt loam, gently undulating. This gently undulating, somewhat poorly drained soil is on natural levees of the Tensas and Black Rivers and other former channels and distributaries of the Mississippi River. Most areas of this soil are subject to rare flooding. The mapped areas are irregular and range from 15 to 300 acres. The landscape is parallel ridges and swales. The ridges are 1 to 5 feet high and 50 to 200 feet wide, and the swales are about 50 to 150 feet wide. Slopes range from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown, medium acid silt loam about 4 inches thick. The subsoil is grayish brown, mottled, medium acid silty clay loam in the upper part and grayish brown, mottled, medium acid silt loam in the lower part. The underlying material to a depth of about 60 inches is gray, mottled, neutral silt loam.

Included with this soil in mapping are a few small areas of Sharkey and Tensas soils. Sharkey and Tensas soils are in lower positions than Dundee soil and have a fine-textured subsoil. Also included are small areas of Dundee silty clay loam and soils similar to the Dundee soil except that they contain less clay in the subsoil. A few small to large areas of Dundee soils that are adequately protected from flooding by levees also are included. The included soils make up about 15 percent of the map unit.

Water and air move through this Dundee soil moderately slowly. This soil has medium fertility. Water runs off the surface at a medium rate and ponds in low places for long periods after heavy rains. A seasonal high water table fluctuates between about 1-1/2 and 3-1/2 feet below the surface during January through April of most years. Plants are damaged by lack of water during dry periods in summer and fall of some years. Unprotected areas of this soil are subject to rare flooding. Flooding occurs less often than 1 year out of

Figure 2.—This building in an area of Dundee silt loam, 0 to 1 percent slopes, is on a properly constructed mound of soil material that is above the expected flood elevation.

10 during the cropping season and on a yearly basis. Flood waters typically are 1 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 30 days.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as pastureland, homesites, or woodland.

This soil is well suited to cultivated crops. It is limited mainly by wetness in the swales. Soybeans, cotton, corn, and small grains are the main crops. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Crops respond well to lime and fertilizer. Limiting tillage for seedbed preparation and weed control reduces runoff and helps control erosion. In flood years, water generally recedes in time to plant a short-season crop in unprotected areas.

This soil is well suited to pasture. The main limitation is wetness in the swales. The main suitable pasture plants are improved bermudagrass, common bermudagrass, ryegrass, Pensacola bahiagrass, white clover, and tall fescue. Grazing when the soil is wet results in compaction of the surface layer. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Proper grazing, weed control, and fertilizer are needed for maximum quality of forage. During flood periods, cattle in unprotected areas need to be moved to adjacent protected areas or to pasture at higher elevations.

This soil is well suited to woodland. It has high potential for the production of hardwood trees, such as cherrybark oak, eastern cottonwood, sweetgum, and water oak. The main concern in producing and harvesting timber is wetness. Equipment use limitations are a concern unless drainage is provided. Trees should be water tolerant, and they need to be planted or harvested during dry periods.

Unless protected from flooding, this soil is poorly suited to urban development. Protected areas are moderately well suited to this use. The main limitations are wetness, low-strength for roads, moderate shrink-swell potential, and the hazard of flooding. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Wetness and moderately slow permeability are limitations for septic tank absorption fields. Sandy backfill for the trench and long absorption lines help to compensate for the moderately slow permeability. Major flood control structures and drainage systems are needed. In unprotected areas of this soil, homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This soil is moderately well suited to recreational development. Wetness is the main limitation. Flooding is a hazard in unprotected areas. Drainage is needed for intensively used areas, such as playgrounds and picnic areas.

This Dundee soil is in capability subclass IIw and in woodland group 2w.

Dn—Dundee silty clay loam, 0 to 1 percent slopes. This level, somewhat poorly drained, loamy soil is on natural levees of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. Most areas of this soil are subject to rare flooding. The mapped areas are irregular in shape and range from 30 to 300 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, medium acid silty clay loam about 5 inches thick. The subsoil is dark grayish brown and grayish brown, mottled, silty clay loam. It is medium acid in the upper part and very strongly acid in the middle and lower parts. The underlying material to a depth of about 60 inches is grayish brown, mottled, medium acid loam.

Included with this soil in mapping are a few small areas of Sharkey and Tensas soils. Sharkey and Tensas soils are in lower positions than Dundee soil and have a clayey subsoil. Also included are a few small to large areas of Dundee soils that are adequately protected from flooding by levees. The included soils make up about 15 percent of the map unit.

Water and air move through this Dundee soil moderately slowly. This soil has medium fertility. Water runs off the surface slowly. A seasonal high water table fluctuates between about 1-1/2 to 3-1/2 feet below the surface during January through April. The surface layer of this soil is sticky when wet and dries slowly once wetted. Plants are damaged by lack of water during dry periods in summer and fall of most years. Unprotected areas of this soil are subject to rare flooding. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis. Flood waters typically are 1 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 30 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as pastureland or homesites.

This soil is well suited to cultivated crops. Soybeans, cotton, corn, and small grains are the main crops. This soil is limited mainly by wetness. It is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Crops respond well to lime and fertilizer. In unprotected areas during flood years, water generally recedes in time to plant a short-season crop.

This soil is well suited to pasture. It is limited mainly by wetness. The main suitable pasture plants are common bermudagrass, improved bermudagrass, ryegrass, Pensacola bahiagrass, white clover, and tall fescue. Excess water can be removed by a surface drainage system. Proper grazing, weed control, and fertilizer are needed for maximum quality of forage. During flood periods, cattle in unprotected areas need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of cherrybark oak, eastern cottonwood, sweetgum, and water oak. However, most areas of this soil have been cleared for use as cropland or pastureland. Wetness limits the use of equipment. Trees should be water tolerant, and they need to be planted or harvested during dry periods.

This soil is moderately well suited to recreational development. It is limited mainly by wetness and the hazard of flooding in unprotected areas. Drainage is needed for intensively used areas, such as playgrounds and picnic areas.

This soil is poorly suited to urban development and homesites. The main soil limitations are wetness, low-strength for roads, moderately slow permeability, moderate shrink-swell potential, and the hazard of flooding. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Moderately slow permeability and the

high water table increase the possibility of failure of septic tank absorption fields. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with soils that have low shrink-swell potential. Major flood control structures and local drainage systems are needed. In unprotected areas of this soil, homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This Dundee soil is in capability subclass IIw and in woodland group 2w.

Ds—Dundee-Alligator complex, gently undulating. These soils are on low parallel ridges and swales within the alluvial plain of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. The components of this map unit are so intricately intermingled that it is not practical to map them separately at the scale used. The somewhat poorly drained Dundee soil is on low, convex ridges that are 75 to 250 feet wide. The poorly drained Alligator soil is in concave swales that are 25 to 200 feet wide (fig. 3). The mapped areas range from about 100 acres to several hundred acres. They are about 50 percent Dundee soil and 28 percent Alligator soil. Slopes range from 0 to 3 percent.

Most areas of these soils are subject to rare flooding. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 30 days.

Typically, the Dundee soil has a surface layer of dark grayish brown, medium acid silty clay loam about 4 inches thick. The subsoil is grayish brown, mottled, medium acid silty clay loam and silt loam. The underlying material to a depth of about 60 inches is grayish brown, mottled, slightly acid very fine sandy loam.

Water and air move through this soil moderately slowly. Dundee soil has medium fertility. Water runs off the surface at a medium rate. A seasonal high water table is about 1-1/2 to 3-1/2 feet below the surface during January through April of most years. Plants are damaged by lack of water during dry periods in summer and fall of most years. This soil has moderate shrink-swell potential.

Typically, the surface layer of the Alligator soil is dark grayish brown, strongly acid silty clay about 6 inches thick. The subsoil is gray, mottled, clay. It is strongly acid in the upper part and slightly acid in the lower part. The underlying material to a depth of about 60 inches is gray, mottled, neutral clay.

Water and air move through this soil very slowly. Alligator soil has medium fertility. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. A seasonal high water table

Figure 3.—Ridge and swale topography in an area of Dundee-Alligator complex, gently undulating. Dundee soil is on the ridges, and Alligator soil is in the swales.

fluctuates between about 1/2 foot to 2 feet below the surface during January through April of most years. The surface layer of this soil remains wet for long periods after heavy rains. Adequate water is available to plants in most years. The soil has very high shrink-swell potential.

Included with this complex in mapping are many small to large areas of Tensas soils. Tensas soils are in positions slightly higher than those of Alligator soil. They have a subsoil that is clayey in the upper part and loamy in the lower part. The Tensas soils make up about 12 percent of the map unit. Also included are a few small areas of Dundee soils that have slopes of more than 3 percent, and small areas of Dundee soils that have a clay or silty clay surface layer about 6 inches thick. A few large areas of Dundee and Alligator soils that are adequately protected from flooding by levees are also included. The included soils make up about 22 percent of the map unit.

Most of the acreage of the soils in this complex is used for cultivated crops. A small acreage is in pastureland or woodland.

The soils in this map unit are moderately well suited to cultivated crops. They are limited mainly by wetness and short, irregular slopes. Erosion is a minor problem of the Dundee soil, and poor tilth is an additional limitation of the Alligator soil. Soybeans, wheat, and grain sorghum are the main crops. The Dundee soil is friable and easy to keep in good tilth. Alligator soil is sticky when wet, hard when dry, and difficult to keep in good tilth. A drainage system is needed for most cultivated crops and pasture plants. Land grading and smoothing improve surface drainage, but in places large volumes of soil need to be moved. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Most crops and pasture plants respond well to fertilizer. Lime is generally needed. In unprotected areas of these soils during flood years, water generally recedes in time to plant a short-season crop.

The soils in this map unit are well suited to pasture. The main limitation is wetness. Suitable pasture plants are common bermudagrass, improved bermudagrass, dallisgrass, white clover, tall fescue, and ryegrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. During flood periods, cattle in unprotected areas of these soils need to be moved to adjacent protected areas or to pastures at higher elevations.

The soils in this map unit are well suited to woodland. The soils have high potential for the production of water oak, sweetgum, eastern cottonwood, and cherrybark oak. The main concerns in producing and harvesting timber are equipment use limitations and moderately high seedling mortality because of wetness. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

The soils in this map unit are poorly suited to urban development, recreational development, and homesites. The main limitations are wetness, moderately slow and very slow permeability, low strength for roads, and moderate and very high shrink-swell potential. Flooding is a hazard in unprotected areas. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Very slow and moderately slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with soils that have low shrink-swell potential. Major flood control structures and local drainage systems are needed. In unprotected areas of these soils, homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This complex is in capability subclass IIIw and in woodland group 2w.

Fa—Fausse clay. This level, very poorly drained soil is in the lowest positions within the alluvial plain of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. The mapped areas are generally oval and range from 20 to 1,000 acres. Slope is dominantly less than 1 percent. This soil is subject to ponding and frequent flooding.

Typically, the surface layer is reddish brown, mottled, medium acid clay about 8 inches thick. The subsoil is gray, mottled, slightly acid clay. The underlying material to a depth of about 60 inches is gray, mottled, mildly alkaline clay. In places, the surface layer is gray.

Included with this soil in mapping are a few small areas of Sharkey soils. Sharkey soils are in slightly higher positions than Fausse soil and crack below a depth of 20 inches in most years. Also included are small areas of soils similar to the Fausse soil except that they have a loamy subsoil. The included soils make up about 10 percent of the map unit.

Water and air move through this Fausse soil very slowly. This soil has high fertility. A seasonal high water table ranges from about 1 foot above the surface to 1-1/2 feet below the surface throughout the year. This soil has very high shrink-swell potential, but it seldom dries enough to shrink and crack. Flooding is frequent on a yearly basis and during the cropping season. Flood waters typically are 1 foot to 5 feet deep, and the depth exceeds 10 feet in places. Flood duration can exceed 6 months.

Most of the acreage of this Fausse soil is in woodland. This soil is best suited to use as habitat for wildlife. It produces habitat for wetland wildlife and for deer, squirrel, and rabbits.

This soil is poorly suited to woodland. It has moderate potential for the production of baldcypress, red maple, water tupelo, and water hickory. However, woodland management is difficult because of long periods of flooding and ponding. Trees can be harvested only by specialized equipment. Regrowth is best accomplished by natural regeneration.

This soil is not suited to cropland, pastureland, homesites, recreational development, and urban development. Flooding is generally too severe for these uses.

This Fausse soil is in capability subclass VIIw and in woodland group 4w.

Fd—Forestdale silty clay loam. This level, poorly drained soil is in low positions and depressional areas on low stream terraces. The mapped areas are generally long and narrow and range from 20 to 300 acres. This soil is subject to rare flooding. Slopes are long and smooth and range from 0 to 1 percent.

Typically, the surface layer is grayish brown, medium acid silty clay loam about 5 inches thick. The subsoil is grayish brown, mottled silty clay. It is strongly acid in the upper part and very strongly acid in the lower part. Below that is a buried surface layer of grayish brown, very strongly acid silt loam about 10 inches thick. The next layer to a depth of about 60 inches is a buried subsoil of dark gray, mottled, very strongly acid silty clay loam.

Included with this soil in mapping are a few small areas of Alligator, Bursley, Calhoun, and Necessity soils. Alligator soils are in lower positions than Forestdale soil and have a more clayey subsoil. Bursley, Calhoun, and Necessity soils are in higher positions than Forestdale soil. Bursley and Calhoun soils are loamy throughout, and Necessity soils have a fragipan. Also included are small areas of Forestdale soils that have a silty clay surface layer. The included soils make up about 15 percent of the map unit.

Water and air move through this Forestdale soil very slowly. Water runs off the surface very slowly. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. Adequate water is available to plants in most years. A seasonal high water table fluctuates between about 1/2 foot and 2 feet below the surface during January through April. The soil has high shrink-swell potential. The surface layer of this soil remains wet for long periods after heavy rains. This soil is subject to flooding after unusually intense rainstorms. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis.

All of the acreage of this soil is used for cultivated crops. This soil is moderately well suited to this use. It is limited mainly by wetness and poor tilth. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Crops respond well to lime and fertilizer.

This soil is well suited to pasture. Wetness is a minor limitation for this use. The main suitable pasture plants are tall fescue, dallisgrass, common bermudagrass, improved bermudagrass, ryegrass, and white clover. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is well suited to woodland. It has very high potential for the production of cherrybark oak, eastern cottonwood, water oak, and sweetgum. Because the surface layer of this soil is sticky when wet, the use of equipment is limited during rainy periods.

This soil is poorly suited to most urban and recreational uses. The main limitations are wetness, high shrink-swell potential, very slow permeability, low strength for roads, and the hazard of flooding. Because of the high water table and very slow permeability, septic tank absorption fields do not function properly. Drainage is needed around homesites and most other urban structures. Protection from flooding is needed. Roads need to be designed to offset the limited ability of the soil to support a load. If buildings are constructed on this soil, properly designed foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

This Forestdale soil is in capability subclass IIIw and in woodland group 1w.

Fo—Forestdale silty clay loam, occasionally flooded. This level, poorly drained soil is in low positions and depressional areas on low stream terraces. The mapped areas are generally long and narrow and range from 10 to 200 acres. Slope is long and smooth and is less than 1 percent.

Typically, the surface layer is dark grayish brown, strongly acid silty clay loam about 7 inches thick. The subsoil, to a depth of about 62 inches, is gray and light gray, mottled, very strongly acid and strongly acid silty clay and silty clay loam. In places, the surface layer is silty clay.

Included with this soil in mapping are a few small areas of Alligator and Necessity soils. The poorly drained Alligator soils are in slightly lower positions than Forestdale soil and contain more clay throughout. The somewhat poorly drained Necessity soils are in higher positions than Forestdale soil and are loamy throughout. Also included are small areas of Forestdale soils that flood more or less often than occasionally. The included soils make up about 10 percent of the map unit.

Water and air move through this Forestdale soil very slowly. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. Water runs off the surface very slowly. Adequate water is available to plants in most years. A seasonal high water table fluctuates between about 1/2 foot and 2 feet below the surface during January to April. The surface layer of this soil remains wet for long periods after heavy rains. This soil has high shrink-swell potential. Flooding occurs less often than 2 years out of 5 during the cropping season and more often than 2 years out of 5 on a yearly basis. Flood waters typically are 2 to 5 feet deep, and the depth exceeds 10 feet in places. Flood duration can exceed 60 days.

Most of the acreage of this soil is in cropland. A small acreage is in woodland or pastureland.

This soil is somewhat poorly suited to cultivated crops. It is limited mainly by wetness, poor tilth, and potentially toxic levels of exchangeable aluminum within the root zone. Soybeans and grain sorghum are the main crops. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Flooding can be controlled by major flood control structures, such as levees and pumps. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Crops respond well to lime and fertilizer, which help to overcome the medium fertility and moderately high levels of exchangeable aluminum. In some flood years, water does not recede in time to plant a crop. In other years, waters recede, but planting is delayed and crop production is reduced.

This soil is moderately well suited to pasture. The main soil limitations are wetness from the seasonal high water table and the hazard of flooding. Wetness limits the choice of plants and the period of grazing. The main suitable pasture plant is common bermudagrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is moderately well suited to woodland. Although this soil has very high potential for the production of water oak, sweetgum, and green ash, management is difficult because of wetness and flooding. Most areas of this Forestdale soil have been cleared for use as cropland or pastureland. Only trees that can tolerate seasonal wetness should be planted. Because the soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This soil is poorly suited to urban and recreational development. It is not suited to dwellings. The main limitations are wetness, very slow permeability, low strength for roads, high shrink-swell potential, and the hazard of flooding. Protection from flooding is needed in areas where buildings are constructed.

This Forestdale soil is in capability subclass IVw and in woodland group 1w.

Gt—Guyton silt loam. This level, poorly drained soil is on alluvial fans of streams that drain the uplands. It is subject to rare flooding. The mapped areas are long and narrow and range from 40 to 300 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is brown, mottled, strongly acid silt loam about 4 inches thick. The subsurface layer is light brownish gray, mottled, strongly acid silt loam about 12 inches thick. The subsoil to a depth of about 60 inches is grayish brown, mottled, strongly acid silty clay loam and clay loam.

Included with this soil in mapping are a few small areas of Oula and Smithdale soils. Oula and Smithdale soils are on nearby uplands. Oula soils have a clayey subsoil. Smithdale soils are loamy and reddish colored throughout. Also included are small areas of Guyton soils that are in low positions and have a thin, clay surface layer and some areas of Guyton soils that are subject to occasional flooding. Included in places are soils similar to Guyton soil except they are browner in the subsoil and have a seasonal high water table that is 3 feet or more below the surface. The included soils make up about 15 percent of the map unit.

Water and air move through this Guyton soil slowly. This soil has low fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. A seasonal high water table fluctuates between a depth of about 1-1/2 feet and the soil surface during December to May. Flooding is rare, but it can occur after unusually severe rainstorms. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil has low shrink-swell potential.

Most of the acreage of this soil is in woodland. A small acreage is used as homesites, pastureland, or cropland.

This soil is well suited to the production of loblolly pine. The main concerns in producing and harvesting timber are severe equipment use limitations and moderate seedling mortality because of wetness. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to May.

This soil is well suited to pasture. The main limitation is wetness. Grazing when the soil is wet results in compaction of the surface layer. Excessive water on the surface can be removed by shallow ditches. The main suitable pasture plants are common bermudagrass and

Pensacola bahiagrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is somewhat poorly suited to cultivated crops. It is limited mainly by wetness, low fertility, and potentially toxic levels of exchangeable aluminum within the root zone. Soybeans, grain sorghum, and wheat are the main crops. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures improve fertility and tilth. Crops respond well to lime and fertilizer designed to overcome low fertility and reduce the high levels of exchangeable aluminum.

This soil is poorly suited to recreational development, urban development, and homesites. The main limitations are wetness, slow permeability, low strength for roads, and the hazard of flooding. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Protection from flooding is needed where dwellings are built. Slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. Sandy backfill for the trench and long absorption lines help to compensate for the slow permeability.

This Guyton soil is in capability subclass IIIw and in woodland group 2w.

Gy—Guyton silt loam, frequently flooded. This level, poorly drained soil is on flood plains and alluvial fans of streams that drain uplands. The mapped areas are long and narrow and range from 40 to 500 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is grayish brown, mottled, medium acid silt loam about 8 inches thick. The subsurface layer is light brownish gray, mottled, medium acid and very strongly acid silt loam about 20 inches thick. The subsoil to a depth of about 70 inches is grayish brown, mottled, very strongly acid silty clay loam.

Included with this soil in mapping are a few small areas of Alligator, Hebert, Oula, Smithdale, and Tensas soils. Alligator and Tensas soils are in lower positions than Guyton soil and have a fine-textured subsoil. Hebert soils are in positions similar to those of the Guyton soil, and they do not have a subsurface layer that tongues into the subsoil. Oula and Smithdale soils are on adjacent uplands. Oula soils have a clay subsoil, and Smithdale soils are loamy throughout. Also included are small areas of soils on natural levees of creeks and streams that are similar to the Guyton soil except that they have a seasonal high water table more than 3 feet below the surface. The included soils make up about 20 percent of the map unit.

Water and air move through this Guyton soil slowly. This soil has low fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. A seasonal high water table fluctuates between a depth of about 1 1/2 feet and the soil surface during December to May. This soil is subject to frequent flooding. Flooding occurs more often than 2 years out of 5 during the cropping season and on a yearly basis. Flood waters typically are 1/2 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 60 days. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil has low shrink-swell potential.

This soil is used mainly as woodland. A small acreage is used as cropland or pastureland.

This soil is moderately well suited to woodland. Although the potential for the production of loblolly pine is high, management is difficult. The soil has severe equipment use limitations and moderately high seedling mortality because of wetness and the hazard of flooding. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods and periods of flooding. Trees should be water tolerant, and they need to be planted or harvested during dry periods.

This soil is poorly suited to cultivated crops. It is limited mainly by wetness and the hazard of flooding. Soybeans and grain sorghum are the main crops. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Crops respond well to lime and fertilizer. In most years, flood waters recede in time to plant a short-season crop. In some years, crops are damaged by flooding late in summer.

This soil is somewhat poorly suited to pasture. The main limitations are wetness and the hazard of flooding. Wetness limits the choice of plants and the period of grazing. The main suitable pasture plant is common bermudagrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is poorly suited to urban and recreational development. It is not suited to dwellings. The hazard of frequent flooding is generally too severe for these uses. Protection from flooding is needed for most urban and recreational uses.

This Guyton soil is in capability subclass Vw and in woodland group 2w.

Hb—Hebert silt loam. This level, somewhat poorly drained soil is on natural levees of the Ouachita River and other former channels and distributaries of the Arkansas River. It is subject to rare flooding. The mapped areas are generally long and narrow and range from 10 to 300 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark brown, medium acid silt loam about 4 inches thick. The subsurface layer is grayish brown, mottled, very strongly acid silt loam about 5 inches thick. The subsoil to a depth of about 65 inches is grayish brown, mottled, very strongly acid, silty clay loam in the upper part; reddish brown, mottled, very strongly acid loam and silty clay loam in the middle part; and reddish brown, mottled, strongly acid silt loam in the lower part.

Included with this soil in mapping are a few small areas of Perry, Rilla, and Sterlington soils. Perry soils are in lower positions than Hebert soil and are clayey throughout. Rilla and Sterlington are in higher positions than Hebert soil. Rilla soils have a redder subsoil, and Sterlington soils contain less clay in the subsoil. Also included are small areas of Hebert soils that are subject to occasional flooding and areas of Hebert soils that have slopes of 1 to 3 percent. The included soils make up about 15 percent of the map unit.

Water and air move through this Hebert soil moderately slowly. This soil has medium fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Water runs off the surface slowly. A seasonal high water table fluctuates between about 1 1/2 and 3 feet below the surface during December through April. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil is subject to rare flooding. Flooding occurs less often than 1 time each 10 years during the cropping season and less often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 30 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as homesites, pastureland, or woodland.

This soil is well suited to cultivated crops. It is limited mainly by wetness and potentially toxic levels of aluminum in the root zone. Suitable crops are cotton, soybeans, grain sorghum, corn, and truck crops. Soybeans is the main crop. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Most crops respond well to lime and fertilizer that are designed to overcome the medium fertility and reduce the levels of exchangeable aluminum. In flood years, water generally recedes in time to plant a short-season crop.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are improved bermudagrass, common bermudagrass, Pensacola bahiagrass, ryegrass, and white clover. Excess water on the surface can be removed by a surface drainage system. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of eastern cottonwood, American sycamore, cherrybark oak, Nuttall oak, and sweetgum. Most areas of this soil have been cleared for use as cropland or pastureland. Wetness limits the use of equipment somewhat. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to May.

This soil is poorly suited to homesites, most sanitary facilities, and urban development. The main limitations are wetness, moderately slow permeability, low strength for roads, and the hazard of flooding. Major flood control structures and local drainage systems are needed. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Septic tank absorption fields do not function properly during rainy periods because of moderately slow permeability and a seasonal high water table. Homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This soil is moderately well suited to recreational development. The main limitations are wetness and moderately slow permeability. Surface drainage is needed for intensively used areas, such as playgrounds.

This Hebert soil is in capability subclass IIw and in woodland group 2w.

He—Hebert silty clay loam. This level, somewhat poorly drained soil is on natural levees of the Ouachita River and other former channels and distributaries of the Arkansas River. It is subject to rare flooding. The mapped areas are generally long and narrow and range from 10 to 200 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, medium acid silty clay loam about 5 inches thick. The subsurface layer is dark grayish brown, mottled, medium acid silt loam about 7 inches thick. The subsoil is brown,

mottled, strongly acid silty clay loam in the upper part and reddish brown, mottled, strongly acid loam and silty clay loam in the lower part. The underlying material to a depth of about 60 inches is reddish brown, mottled, slightly acid silty clay loam.

Included with this soil in mapping are a few small areas of Perry, Rilla, and Sterlington soils. Perry soils are in lower positions than Hebert soil and are clayey throughout. Rilla and Sterlington soils are in higher positions than Hebert soils. Rilla soils have a redder subsoil, and Sterlington soils contain less clay in the subsoil. Also included are small areas of Hebert soils that are subject to occasional flooding and areas that have slopes of 1 to 3 percent. The included soils make up about 15 percent of the map unit.

Water and air move through this Hebert soil moderately slowly. This soil has medium fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Water runs off the surface slowly. The surface layer of this soil is sticky when wet and dries slowly once wetted. A seasonal high water table fluctuates between about 1-1/2 and 3 feet below the surface during December through April. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil is subject to rare flooding. Flooding occurs less often than 1 time each 10 years during the cropping season and less often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 3 feet deep, and the depth exceeds 5 feet in places. Flood duration may exceed 30 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as homesites, pastureland, or woodland.

This soil is well suited to cultivated crops. It is limited mainly by wetness and potentially toxic levels of exchangeable aluminum within the root zone. Suitable crops are cotton, soybeans, grain sorghum, corn, and truck crops (fig. 4). Soybeans is the main crop. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Most crops respond well to lime and fertilizer that are designed to overcome the medium fertility and reduce the high levels of exchangeable aluminum. In flood years, water generally recedes in time to plant a short-season crop.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are improved bermudagrass, common bermudagrass, Pensacola bahiagrass, ryegrass, and white clover. Excess water on the surface can be removed by a surface drainage system. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of eastern cottonwood, American sycamore, cherrybark oak, Nuttall oak, and sweetgum. Most areas of this soil have been cleared for use as cropland or pastureland. Wetness limits the use of equipment. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to May.

This soil is poorly suited to homesites, most sanitary facilities, and urban development. The main limitations are wetness, moderately slow permeability, low strength for roads, and the hazard of flooding. Major flood control structures and local drainage systems are needed. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Septic tank absorption fields do not function properly during rainy periods because of moderately slow permeability and a seasonal high water table. Homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This soil is moderately well suited to recreational development. The main limitations are wetness and moderately slow permeability. Surface drainage is needed, particularly for intensively used areas, such as playgrounds.

This Hebert soil is in capability subclass IIw and in woodland group 2w.

Hh—Hebert silt loam, gently undulating, occasionally flooded. This somewhat poorly drained soil is on point bars and in low areas that are immediately adjacent to the Ouachita River. The landscape is parallel ridges and swales that were formed by the meandering of the Ouachita River and other former channels and distributaries of the Arkansas River. The ridges are 1 foot to 10 feet high and 30 to 50 feet wide. The swales are about 40 to 100 feet wide. The mapped areas of this soil range from about 60 to 200 acres. Slopes are generally short and choppy and range from 0 to 3 percent, but in some small areas of this soil, slopes are more than 3 percent.

Typically, the surface layer is brown, strongly acid silt loam about 4 inches thick. The subsoil is grayish brown, mottled, very strongly acid silty clay loam. The next layer to a depth of about 60 inches is grayish brown, mottled,

Figure 4.—Corn, ready to be harvested, in an area of Hebert silty clay loam.

strongly acid silty clay loam. In places, reddish layers are in the subsoil below a depth of 30 inches.

Included with this soil in mapping are a few small areas of Perry, Rilla, and Sterlington soils. Perry soils are in some of the swales and are clayey throughout. Rilla and Sterlington soils are in higher positions than Hebert soil. Rilla soils have a subsoil that is redder than the subsoil in the Hebert soil, and Sterlington soils have a subsoil that contains less clay. The included soils make up about 20 percent of the map unit.

Water and air move through this Hebert soil moderately slowly. Water runs off the surface slowly and ponds in the swales for long periods after heavy rains. This soil has medium fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. A seasonal high water table fluctuates between about 1 1/2 and 3 feet below the surface during December through April of most years. This soil is subject to brief to very long periods of flooding. Flooding occurs less often than 2 times each 5 years during the cropping season and more often than 2 years out of 5 on a yearly basis. Flood waters typically are 5 to 10 feet deep, and the depth exceeds 15 feet in places. Flood duration can exceed 60 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as pastureland or woodland.

This soil is moderately well suited to cultivated crops. It is limited mainly by wetness, flooding, irregular slopes, and potentially toxic levels of aluminum within the root zone. Short-season crops, such as soybeans and grain sorghum, are best suited. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Most crops respond well to lime and fertilizer that are designed to overcome the medium fertility and reduce the high levels of

exchangeable aluminum. Protection from flooding is possible only by constructing levees to control overflow from the Ouachita River. Flood waters generally recede in time to plant a short-season crop. However, crops are damaged by late summer flooding in some years.

This soil is moderately well suited to pasture. The main limitation is wetness, and the main hazard is flooding. The main suitable pasture plant is common bermudagrass. Excess water on the surface can be removed by installing a suitable drainage system. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of eastern cottonwood, American sycamore, sweetgum, water oak, and Nuttall oak. The main concerns in producing and harvesting timber are wetness and flooding. Equipment limitations are a concern unless drainage and protection from flooding are provided. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is poorly suited to urban and recreational development. It is not suited to dwellings. Protection from flooding is needed for most urban and recreational uses.

This Hebert soil is in capability subclass IIIw and in woodland group 2w.

Lo—Loring silt loam. This nearly level, moderately well drained soil is on low ridges on the Macon Ridge, a loess mantled, high stream terrace. The mapped areas are generally long and narrow and range from 5 to 150 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is yellowish brown, medium acid silt loam about 6 inches thick. The subsoil is dark brown, very strongly acid and strongly acid silt loam and silty clay loam. The next layer is a dark brown, strongly acid silt loam fragipan. The underlying material to a depth of about 60 inches is dark brown, mottled, medium acid silt loam.

Included with this soil in mapping are a few small areas of Calhoun, Calloway, and Memphis soils. Calhoun soils are in lower positions than Loring soil and are grayer throughout. Calloway soils are in slightly lower positions than Loring soil and have grayish mottles within a depth of 16 inches. Memphis soils are in slightly higher positions than Loring soil and do not have a fragipan. The included soils make up about 20 percent of the map unit.

Water and air move through this Loring soil moderately slowly. This soil has medium fertility. Water is perched above the fragipan about 2 to 3 feet below the surface during December through March of most years. Water runs off the surface slowly. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil has low shrink-swell potential.

Most of the acreage of this soil is in cropland. A small acreage is used as pastureland or for homesites.

This soil is well suited to cultivated crops. Wetness is the main limitation for this use. Cotton, soybeans, corn, and small grains are the main crops. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Most crops and pasture plants respond well to fertilizer. Lime is generally needed. Waterways need to be shaped and seeded to perennial grasses. Limiting tillage for seedbed preparation and weed control reduces runoff and helps to control erosion.

This soil is well suited to pasture. It has few limitations for this use. The main suitable pasture plants are common bermudagrass, improved bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is well suited to woodland; but because it is also suited to cropland, most areas of this soil have been cleared for use as cropland or pastureland. It has few limitations for woodland management. The potential production of pine and hardwoods, such as loblolly pine, sweetgum, and southern red oak, is high.

This soil is moderately well suited to recreational development. The main limitations are wetness and moderately slow permeability. Good drainage is needed for intensively used areas, such as playgrounds. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

This soil is moderately well suited to urban development. The main limitations are low strength for roads, wetness, and moderately slow permeability. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by shallow ditches and by providing the proper grade. Establishing and maintaining plant cover can be achieved through proper fertilizing, seeding, mulching, and shaping of the slopes. Roads need to be designed to offset the limited ability of the soil to support a load. Moderately slow permeability and the seasonal high water table increase the possibility of failure of septic tank absorption fields. If the density of housing is moderate to high, community

sewage systems are needed to prevent contamination of water supplies as a result of seepage.

This Loring soil is in capability subclass IIw and in woodland group 2o.

Lr—Loring silt loam, rarely flooded. This nearly level, moderately well drained soil is on ridges and knolls of the Wallace Ridge, a loess mantled, low stream terrace. The mapped areas are long and narrow and range from 5 to 150 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown, medium acid silt loam about 7 inches thick. The subsoil is brown, medium acid silt loam in the upper part and brown, strongly acid, silty clay loam in the lower part. The next layer is a compact and brittle, yellowish brown, strongly acid silty clay loam and silt loam fragipan. The underlying material to a depth of about 65 inches is strong brown, mottled, medium acid silt loam.

Included with this soil in mapping are a few small areas of Calhoun, Calloway, and Memphis soils. The well drained Memphis soils are in higher positions than Loring soil and do not have a fragipan. The poorly drained Calhoun soils are in lower positions than Loring soil and are grayish throughout. The somewhat poorly drained Calloway soils are in slightly lower positions than Loring soil and have grayish mottles in the subsoil. The included soils make up about 20 percent of the map unit.

Water and air move through this Loring soil at a moderately slow rate. Water runs off the surface slowly. This soil has medium fertility. Water is perched above the fragipan 2 to 3 feet below the surface during December through March of most years. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil is subject to rare flooding. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis. Flood waters typically are 1 foot to 2 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 14 days.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as pastureland or for homesites.

This soil is well suited to cultivated crops. Wetness is the main limitation for this use. Cotton, soybeans, corn, and small grains are the main crops. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Land grading and smoothing improve surface drainage, but in places large volumes of soil need to be moved. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Most crops and pasture plants respond well to fertilizer. Lime is generally needed. Waterways need to be shaped and seeded to perennial grasses. Limiting tillage for seedbed preparation and weed control reduces runoff and helps to control erosion.

This soil is well suited to pasture. It has few limitations for this use. The main suitable pasture plants are improved bermudagrass, common bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland; but because it is also suited to cropland, most areas of this soil have been cleared for use as cropland or pastureland. This soil has few limitations to woodland management. The potential production of pine and hardwoods, such as loblolly pine, sweetgum, and cherrybark oak, is high.

This soil is moderately well suited to recreational development. The main limitations are wetness and moderately slow permeability. Good drainage is needed for intensively used areas, such as playgrounds. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

This soil is poorly suited to homesites and urban development. The main limitations are low strength for roads, wetness, moderately slow permeability, and the hazard of flooding. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by shallow ditches and by providing the proper grade. Preserving the existing plant cover during construction helps to control erosion. Roads need to be designed to offset the limited ability of the soil to support a load. Septic tank absorption fields do not function properly during rainy periods because of wetness and moderately slow permeability. Flooding can be controlled by use of major flood control structures. Homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This Loring soil is in capability subclass IIw and in woodland group 2o.

Me—Memphis silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on convex slopes on low and high stream terraces. The mapped areas are irregular in shape and range from 15 to 300 acres.

Typically, the surface layer is dark grayish brown, medium acid silt loam about 5 inches thick. The subsoil is dark brown, strongly acid silty clay loam and silt loam. The underlying material to a depth of about 71 inches is dark brown, strongly acid silt loam.

Included with this soil in mapping are a few small areas of Calhoun, Calloway, and Loring soils. Calhoun soils are in drainageways and are grayish throughout. Calloway and Loring soils are in slightly lower positions

than Memphis soil and have a fragipan. Also included are small areas of Memphis soils that have slopes of 2 to 4 percent. The included soils make up about 15 percent of the map unit.

Water and air move through this Memphis soil at a moderate rate. This soil has medium fertility. Water runs off the surface at a medium rate. This soil dries quickly after rains. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil has low shrink-swell potential.

Most areas of this soil are used as cropland. A few areas are used for pasture, homesites, or urban development.

This soil is well suited to cultivated crops. It has few limitations for this use. The main suitable crops are cotton, soybeans, corn, truck crops, oats, and wheat. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Crops respond well to lime and fertilizer. Waterways need to be shaped and seeded to perennial grasses. Limiting tillage for seedbed preparation and weed control reduces runoff and helps to control erosion.

This soil is well suited to pasture. It has few limitations for this use. The main suitable pasture plants are common bermudagrass, improved bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. Proper stocking and pasture rotation help keep the pasture in good condition. Proper grazing, weed control, lime, and fertilizer are needed for maximum quality of forage.

This soil is well suited to woodland; but because it is also suited to cropland, most areas have been cleared for use as cropland or pastureland. This soil has few limitations to woodland management. It has very high potential for the production of loblolly pine.

This soil is well suited to recreational development. It has few limitations for this use. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by controlling traffic and adding fertilizer.

This soil is well suited to urban development. The main limitations are low strength for roads and moderate permeability for septic tank absorption fields. The hazard of erosion is increased if the soil is left exposed during site development. Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. Roads need to be designed to offset the limited ability of the soil to support a load. The limitation of moderate permeability can be partly overcome by increasing the size of the absorption field. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage.

This soil is in capability class I and in woodland group 1o.

Mh—Memphis silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex slopes of high and low stream terraces. The mapped areas are irregular in shape and range from 15 to 50 acres.

Typically, the surface layer is brown, medium acid silt loam about 5 inches thick. The subsoil is dark brown, medium acid silty clay loam in the upper part and dark brown, strongly acid silt loam in the lower part. The underlying material to a depth of about 64 inches is dark brown, strongly acid silt loam.

Included with this soil in mapping are a few small areas of Calhoun, Calloway, and Loring soils. These soils are in lower positions than Memphis soil. Calhoun soils are grayish throughout, and Calloway and Loring soils have a fragipan. Also included are a few small areas of Memphis soils that have slopes of 5 to 7 percent and Memphis soils that have slopes of less than 2 percent. The included soils make up about 5 percent of the map unit.

Water and air move through this Memphis soil at a moderate rate. This soil has medium fertility. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil dries quickly after rains. Runoff is medium, and the hazard of water erosion is severe. This soil has low shrink-swell potential.

Most areas of this soil are used as cropland. A few areas are used for pasture or homesites.

This soil is well suited to cultivated crops. Slope is the main soil limitation, and erosion is the main hazard. The main suitable crops are cotton, soybeans, corn, truck crops, oats, and wheat. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Crops respond well to lime and fertilizer. Early fall seeding, minimum tillage, and construction of terraces, diversions, and grassed waterways help to control erosion. Drop structures installed in grassed waterways help to prevent gullying. All tillage needs to be on the contour or across the slope. Limiting tillage for seedbed preparation and weed control reduces runoff and helps to control erosion.

This soil is well suited to pasture. It has few limitations for this use. The main suitable pasture plants are common bermudagrass, improved bermudagrass, crimson clover, Pensacola bahiagrass, and ryegrass.

Proper grazing, weed control, and fertilizer are needed for maximum quality of forage.

This soil is well suited to woodland; but because it is also suited to cropland, most areas have been cleared for use as cropland or pastureland. It has few limitations to woodland management. This soil has very high potential for the production of loblolly pine.

This soil is well suited to recreational development. It has few limitations for this use. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by controlling traffic and by fertilizing.

This soil is well suited to urban development and homesites. The main limitations are slope, moderate permeability, and low strength for roads. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. Roads need to be designed to offset the limited ability of the soil to support a load. The limitation of moderate permeability can be partly overcome by increasing the size of the absorption field. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage.

This Memphis soil is in capability subclass IIe and in woodland group 1o.

Mm—Memphis silt loam, 5 to 12 percent slopes. This moderately sloping and strongly sloping, well drained soil is on convex slopes of the Macon Ridge, a loess mantled, high stream terrace. The mapped areas are irregular in shape and range from 15 to 50 acres.

Typically, the surface layer is brown, medium acid silt loam about 5 inches thick. The subsoil is dark brown, strongly acid silty clay loam in the upper part and yellowish brown, strongly acid silty clay loam and silt loam in the lower part. The underlying material to a depth of about 60 inches is yellowish brown, medium acid silt loam.

Included with this soil in mapping are a few small areas of Calhoun, Calloway, and Loring soils. The poorly drained Calhoun soils are in drainageways and flat depressional areas and are grayish throughout. Calloway and Loring soils are in lower positions than Memphis soil and have a fragipan. Also included are a few small eroded spots. The included soils make up about 15 percent of the map unit.

Water and air move through this Memphis soil at a moderate rate. Runoff is rapid, and the hazard of water erosion is severe. This soil has medium fertility. It dries quickly after rains. The shrink-swell potential is low.

This soil is best suited to pasture, recreation, habitat for wildlife, and woodland. Most of the acreage is in woodland. A small acreage is used for pasture or homesites.

This soil is moderately well suited to pasture. The main suitable pasture plants are common bermudagrass, improved bermudagrass, crimson clover, Pensacola bahiagrass, and ryegrass. Seedbed preparation needs to be on the contour or across the slope if practical. Fertilizer and lime are needed for optimum growth of grasses and legumes. Proper grazing, weed control, and fertilizer are needed for maximum quality of forage.

This soil is well suited to woodland. It has very high potential for the production of loblolly pine. This soil has few limitations for woodland management.

This soil is somewhat poorly suited to cultivated crops. Because the hazard of erosion is severe, few areas of this soil are likely to be cultivated. Where this soil is cultivated, the risk of erosion can be reduced by gradient terraces and contour farming.

This soil is moderately well suited to urban and recreational development and homesites. The main limitations are slope, moderate permeability, and low strength for roads. Erosion is a severe hazard. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. Roads need to be designed to offset the limited ability of the soil to support a load. Steepness of slope and moderate permeability are concerns in installing septic tank absorption fields. The limitation of moderate permeability can be partly overcome by increasing the size of the absorption field. Absorption lines need to be installed on the contour to prevent effluent from surfacing downslope and creating a hazard to health.

This Memphis soil is in capability subclass IVe and in woodland group 1o.

MP—Memphis-Kisatchie-Oula association, 5 to 40 percent slopes. These well drained soils are in a regular and repeating pattern on uplands. The landscape is very narrow, moderately sloping to strongly sloping ridgetops and moderately steep to steep side slopes. It is dissected by many narrow drainageways. A few eroded spots, shallow to deep gullies, and outcrops of sandstone and siltstone are in most areas (fig. 5).

The mapped areas range from 100 to several hundred acres and are about 34 percent Memphis soil, 24 percent Kisatchie soil, and 24 percent Oula soil. Memphis soil is on ridgetops and upper side slopes. Slopes range from 5 to 25 percent. Oula and Kisatchie soils are on middle and lower side slopes. Slopes range from 12 to 40 percent.

Fewer observations were made in this map unit than in other areas because the steep slopes and rock outcrops are major limitations to the use and management of these soils. For this reason, separation of the soils would

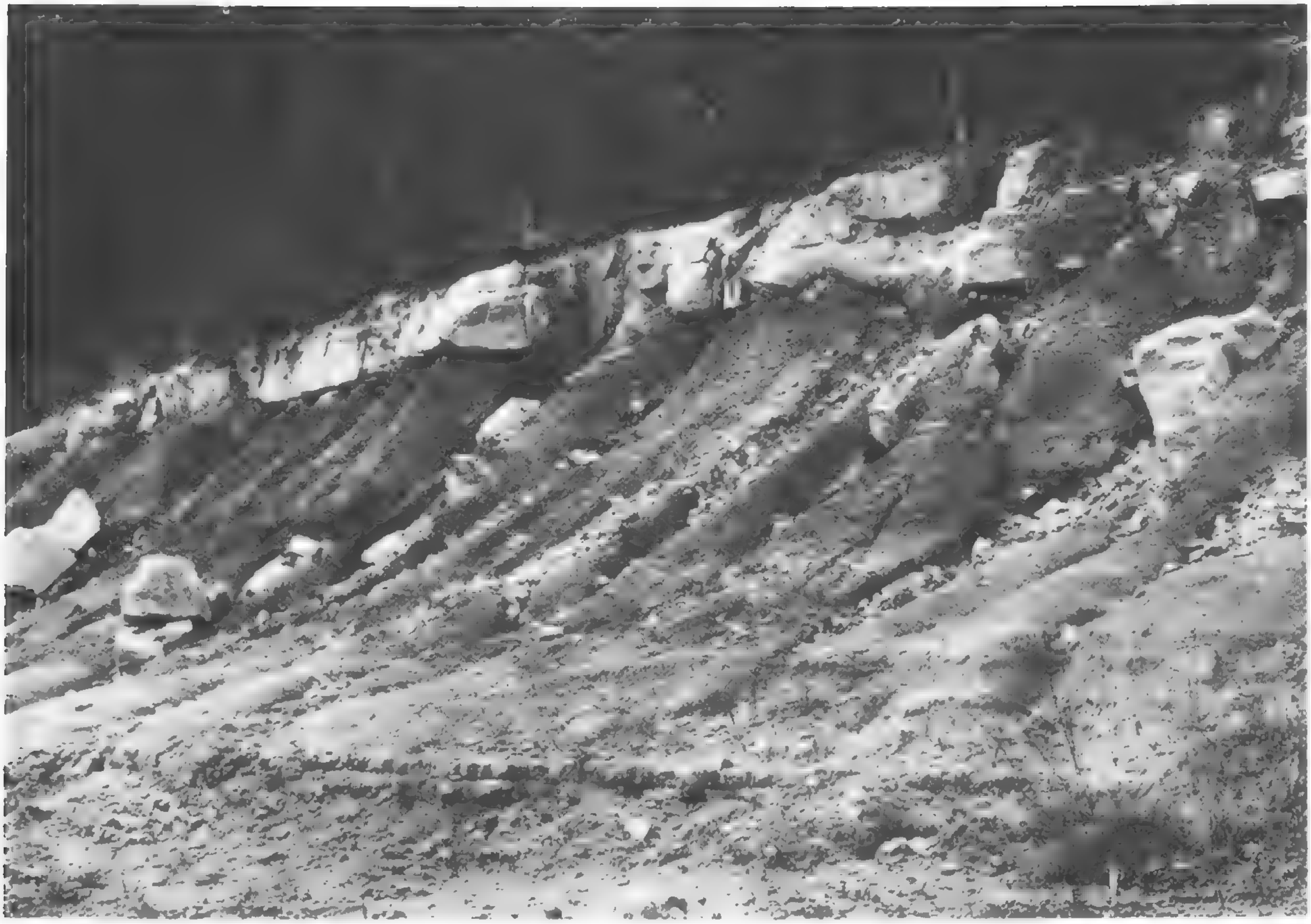


Figure 5.—Outcrops of sandstone in Kisatchie soil in an area of Memphis-Kisatchie-Oula association, 5 to 40 percent slopes.

be of little value to the land user, but the detail in mapping is adequate for the expected use of these soils.

Typically, the Memphis soil has a surface layer of brown, strongly acid silt loam about 3 inches thick. The subsoil is strong brown, strongly acid silty clay loam in the upper part and strong brown, strongly acid silt loam in the lower part. The underlying material to a depth of about 70 inches is yellowish brown, medium acid silt loam.

Water and air move through Memphis soil at a moderate rate. Runoff is rapid, and the hazard of water erosion is very severe. This soil has medium fertility. The shrink-swell potential is low.

Typically, the Kisatchie soil has a surface layer of very dark gray, very strongly acid silt loam about 6 inches thick. The subsoil, to a depth of about 34 inches, is light olive brown, very strongly acid clay. Below that to a depth of about 60 inches is olive siltstone. In some places, the surface layer is very fine sandy loam. In other places, the surface layer has been lost to erosion.

Water and air move through Kisatchie soil very slowly. Runoff is very rapid, and the hazard of water erosion is very severe. The Kisatchie soil has low fertility. It has high shrink-swell potential. The effective root zone ranges from a depth of 20 to 40 inches.

Typically, the Oula soil has a surface layer of dark grayish brown, medium acid silty clay about 2 inches thick. The subsoil is brown, very strongly acid clay in the upper part and yellowish brown, very strongly acid clay in the lower part. The underlying material to a depth of about 60 inches is light yellowish brown, very strongly acid silty clay in the upper part and light brownish gray, very strongly acid clay in the lower part.

Water and air move through Oula soil very slowly. Runoff is very rapid, and the hazard of water erosion is

very severe. This soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. It has high shrink-swell potential.

Included with these soils in mapping are a few small areas of Guyton and Smithdale soils. Guyton soils are in drainageways and are silty and grayish throughout. Smithdale soils are on upper side slopes and are reddish and loamy throughout. Included in places are soils similar to Memphis soil except that they have an alkaline subsoil. The included soils make up about 18 percent of the map unit.

All areas of the soils in this association are in woodland. They are used for timber production and as habitat for wildlife.

The soils in this map unit are moderately well suited to woodland. Memphis soil has very high potential for the production of loblolly pine, Kisatchie soil has moderate potential, and Oula soil has moderately high potential for this use. The main concerns in producing and harvesting timber are steepness of slope and minimizing the risk of erosion. Conventional methods of harvest are difficult to use because of steepness of slope and the presence of gullies. Machine planting is possible in the more gently sloping areas, but it is difficult in the steeper areas. The surface layer of the Oula soil is sticky when wet. This is an additional limitation to the use of equipment.

These soils produce habitat for squirrel, duck, turkey, and many other species of woodland wildlife. Habitat for wildlife can be improved by leaving den and mast-producing trees along drainageways when harvesting timber.

These soils are poorly suited to cropland and pasture. Steepness of slope limits the use of farm equipment to the more gently sloping areas.

These soils are poorly suited to urban development, recreational development, and homesites. The main limitation is steepness of slope. Buildings and roads are generally difficult to construct because of this limitation. Effluent from septic tank absorption lines can surface downslope and create a hazard to health.

Memphis and Kisatchie soils are in capability subclass VIe, and Oula soil is in capability subclass VIIe. Memphis soil is in woodland group 1r, Kisatchie is in 4d, and Oula is in 3c.

MS—Memphis-Smithdale association, 5 to 40 percent slopes. These well drained soils are in a regular and repeating pattern on uplands. The landscape is very narrow, moderately sloping to strongly sloping ridgetops and moderately steep to steep side slopes. It is dissected by many narrow drainageways. Eroded spots and shallow to deep gullies are in some areas of these soils.

The mapped areas range from 100 to several hundred acres and are about 52 percent Memphis soil and 29 percent Smithdale soil. Memphis soil is on ridgetops and upper side slopes. Slopes range from 5 to 25 percent. Smithdale soil is on middle and lower side slopes. Slopes range from 12 to 40 percent.

Fewer observations were made in the areas of these soils than in other areas because the steep slopes are major limitations to the use and management of these soils. For this reason, separation of the soils would be of little value to the land user, but the detail in mapping is adequate for the expected use of these soils.

Typically, the Memphis soil has a surface layer of brown, medium acid silt loam about 2 inches thick. The subsoil is brown, medium acid silt loam in the upper part and dark yellowish brown, strongly acid silt loam in the lower part. The underlying material to a depth of about 62 inches is dark yellowish brown, medium acid silt loam. In places, the lower part of the subsoil is mildly alkaline.

Water and air move through this soil at a moderate rate. Runoff is rapid, and the hazard of water erosion is very severe. This soil has medium fertility. It has low shrink-swell potential.

Typically, the Smithdale soil has a surface layer of brown, strongly acid fine sandy loam about 4 inches thick. The subsurface layer is brown, very strongly acid fine sandy loam about 8 inches thick. The subsoil to a depth of about 60 inches is yellowish red, very strongly acid sandy clay loam.

Water and air move through this soil at a moderate rate. Runoff is very rapid, and the hazard of water erosion is very severe. This soil has low fertility and high levels of exchangeable aluminum that are potentially toxic to some plants. The shrink-swell potential is low.

Included with this association in mapping are a few small areas of Kisatchie, Lucy, and Oula soils. Kisatchie soils are on some of the side slopes and have a clayey subsoil and are underlain by siltstone. Lucy and Oula soils are on side slopes. Lucy soils have sandy surface and subsurface layers and a loamy subsoil. Oula soils have a clay subsoil. The included soils make up about 19 percent of the map unit.

All of the soils in this map unit are in woodland. They are used for timber production and as habitat for wildlife.

The soils in this map unit are moderately well suited to woodland. Memphis soil has very high potential for the production of loblolly pine, and Smithdale soil has high potential for this use. The main concerns in producing and harvesting timber is steepness of slope and minimizing the risk of erosion. Steepness of slope limits the use of equipment and creates a very severe hazard of erosion. Because of the steepness of slope, conventional methods of planting and harvesting trees are difficult to use. Poor traction with logging equipment is also a problem in the included areas of the Lucy soils.

The soils in this map unit produce habitat for deer, squirrel, turkey, rabbit, and other woodland wildlife. Habitat for wildlife can be improved by leaving den and mast-producing trees along drainageways when

harvesting timber and during site preparation for tree planting.

The soils in this map unit are poorly suited to cropland and pastureland. Slopes are generally too steep for the safe operation of farm machinery.

The soils in this map unit are poorly suited to recreational and urban development. Steepness of slope is the main limitation.

Memphis soil is in capability subclass VIe, and Smithdale soil is in VIIe. Memphis soil is in woodland group 1r, and Smithdale soil is in 2r.

Mt—Moreland clay. This level, somewhat poorly drained soil is in low positions on the Red River alluvial plain. It is subject to rare flooding. The mapped areas are irregular in shape and range from 20 to 300 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark reddish brown, calcareous, mildly alkaline clay about 12 inches thick. The subsoil is reddish brown, mottled, calcareous, mildly alkaline clay. The underlying material to a depth of about 67 inches is reddish brown, mottled, calcareous, neutral clay.

Included with this soil in mapping are a few small areas of Norwood and Sharkey soils. Norwood soils are in higher positions than Moreland soil and are loamy throughout. Sharkey soils are in slightly lower positions than Moreland soil and are grayish throughout. Also included are small areas of Moreland soils that are subject to occasional flooding. The included soils make up about 15 percent of the map unit.

Water and air move through this Moreland soil very slowly. This soil has high fertility. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. Adequate water is available to plants in most years. A seasonal high water table fluctuates between a depth of about 1-1/2 feet and the soil surface during December through April. This soil is subject to flooding after unusually intense rainstorms or when protection levees fail. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. This soil has very high shrink-swell potential. The surface layer of this soil is very sticky when wet and hard when dry. This soil dries slowly after heavy rains.

All areas of this soil are used for cultivated crops, mainly soybeans. This soil is moderately well suited to cultivated crops. It is limited mainly by wetness and poor tilth. Suitable crops are soybeans, grain sorghum, wheat, cotton, and corn. This soil becomes cloddy if farmed when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and help to maintain soil tilth and content of organic matter.

This soil is well suited to pasture. Wetness is the main limitation. The main suitable pasture plants are common bermudagrass, improved bermudagrass, dallisgrass, and white clover. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition.

This soil is well suited to woodland. It has high potential for the production of hardwood trees. Because the surface layer is sticky when wet, the use of equipment is severely limited during wet periods.

This soil is poorly suited to urban development, homesites, and recreational development. The main limitations are wetness, very slow permeability, very high shrink-swell potential, low strength for roads, and the hazard of flooding. Excess water can be removed by shallow ditches and by providing the proper grade. Protection from flooding is needed. Roads need to be designed to offset the limited ability of the soil to support a load. Septic tank absorption fields do not function properly during rainy periods because of wetness and very slow permeability. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with soil material that has low shrink-swell potential.

This Moreland soil is in capability subclass IIIw and in woodland group 2w.

Ne—Necessity silt loam, rarely flooded. This nearly level, somewhat poorly drained soil is on low ridges and knolls on the Wallace Ridge, a loess mantled, low stream terrace. The mapped areas are irregular in shape and range from 5 to 150 acres. Slopes are long and smooth and range from 0 to 2 percent.

Typically, the surface layer is brown, very strongly acid silt loam about 5 inches thick. The subsoil is yellowish brown, mottled, very strongly acid silty clay loam. The next layer is dark yellowish brown silty clay loam and light brownish gray, very strongly acid silt loam. The next layer is a fragipan of dark brown, mottled, very strongly acid loam and clay loam. The next layer to a depth of about 80 inches is dark brown, very strongly acid clay loam.

Included with this soil in mapping are a few small areas of Bursley, Calhoun, and Forestdale soils. Bursley soils are in slightly lower positions than Necessity soil and do not have a fragipan. Calhoun and Forestdale soils are in lower positions than Necessity soil. Calhoun soils are grayish throughout, and Forestdale soils have a fine-textured subsoil. Also included are small areas of Necessity soils that have slopes of 2 to 4 percent. The included soils make up about 15 percent of the map unit.

Water and air move through this Necessity soil slowly. This soil has medium fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Adequate water is available to plants in most years. A seasonal high water table fluctuates between about 1 foot and 2 feet below the surface during

December through March. This soil dries slowly after heavy rains. It is subject to rare flooding. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 3 feet deep. Flood duration can exceed 30 days. This soil has low shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as homesites, pastureland, or woodland.

This soil is well suited to cultivated crops. It is limited mainly by wetness. Suitable crops are soybeans, cotton, corn, grain sorghum, and truck crops. Soybeans is the main crop. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Most crops and pasture plants respond well to fertilizer. Lime is generally needed. Limiting tillage for seedbed preparation and weed control reduces runoff and helps to control erosion. Flooding can be controlled only by extensive regional flood control measures, such as levees and pumps. Flood waters generally recede in time to plant a short-season crop.

This soil is well suited to pasture. The main limitations are wetness and medium fertility. The main suitable pasture plants are improved bermudagrass, common bermudagrass, Pensacola bahiagrass, white clover, and ryegrass. Excessive water on the surface can be removed by a surface drainage system. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of loblolly pine, water oak, cherrybark oak, and sweetgum. The main concern in producing and harvesting timber is wetness, which limits the use of equipment. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to May.

This soil is poorly suited to homesites and recreational and urban development. The main limitations are wetness, slow permeability, low strength for roads, and the hazard of flooding. Major flood control structures and local drainage systems are needed. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and slow permeability of this soil, septic tank absorption fields do not function properly during rainy periods. Homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This Necessity soil is in capability subclass IIw and in woodland group 2w.

No—Norwood silt loam. This level, well drained soil is in high and intermediate positions on natural levees of the Red River. The mapped areas range from about 100 to 1,000 acres. This soil is subject to rare flooding. Slope is dominantly less than 1 percent.

Typically, the surface layer is reddish brown, calcareous, mildly alkaline silt loam about 9 inches thick. The subsoil is yellowish red, calcareous, mildly alkaline silt loam. The underlying material to a depth of about 60 inches is yellowish red, calcareous, moderately alkaline silt loam and very fine sandy loam. In places, the surface layer is silty clay loam.

Included with this soil in mapping are a few small areas of Moreland and Roxana soils. Moreland soils are in lower positions than Norwood soil and are clayey throughout. Roxana soils are in higher positions than Norwood soil and have a subsoil that contains less clay than the Norwood soil. Also included are a few small to large areas of soils that are adequately protected from flooding by levees. The included soils make up about 15 percent of the map unit.

Water and air move through this Norwood soil at a moderate rate. This soil has high fertility. Adequate water is available to plants in most years. This soil dries quickly after rains. Water runs off the surface slowly. This soil has low shrink-swell potential. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis.

This soil is used mainly for cultivated crops. A small acreage is used for woodland or homesites.

This soil is well suited to cultivated crops. It has few limitations for this use. Suitable crops are soybeans, cotton, corn, grain sorghum, and wheat. Soybeans is the main crop. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. A tillage pan forms easily if this soil is tilled when wet. Chiseling or subsoiling can be used to break up the pan. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter help to maintain fertility, soil tilth, and content of organic matter.

This soil is well suited to woodland; but because it is also suited to cropland, most areas of this soil have been cleared for use as cropland. It has high potential for the production of hardwood trees, such as eastern cottonwood. This soil has few limitations for woodland management.

This soil is poorly suited to homesites and most other urban and recreational uses. The main limitation is

flooding. Low strength is a limitation for roads, and moderate permeability is a limitation to septic tank absorption fields. The effects of moderate permeability can be partly overcome by increasing the size of the absorption field. Roads need to be designed to offset the limited ability of the soil to support a load. Protection from flooding is needed.

This Norwood soil is in capability class I and in woodland group 2o.

OA—Oula-Providence-Smithdale association, 5 to 40 percent slopes. The well drained Oula and Smithdale soils and moderately well drained Providence soil are in a regular and repeating pattern on uplands. The landscape is very narrow, moderately sloping to strongly sloping ridgetops and moderately steep to steep side slopes. It is dissected by many narrow drainageways. Eroded spots, shallow to deep gullies, and outcrops of siltstone and sandstone are in some areas.

The mapped areas range from 100 to several hundred acres and are about 25 percent Oula soil, 24 percent Providence soil, and 23 percent Smithdale soil. Oula and Smithdale soils are on side slopes. Slopes range from 12 to 40 percent. Providence soil is on ridgetops. Slopes range from 5 to 12 percent.

Fewer observations were made in this map unit than in other areas because the steep slopes are a major limitation to the use and management of these soils. For this reason, separation of the soils would be of little value to the land user. The detail in mapping, however, is adequate for the expected use of these soils.

Typically, the Oula soil has a surface layer of very dark grayish brown, strongly acid silty clay about 2 inches thick. The subsoil is very strongly acid or strongly acid clay. It is light yellowish brown in the upper part and pale brown in the middle and lower parts. The underlying material to a depth of about 60 inches is pale brown, strongly acid clay.

Water and air move through this soil very slowly. Runoff is very rapid, and the hazard of water erosion is very severe. Oula soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. It has high shrink-swell potential.

Typically, the Providence soil has a surface layer of very dark grayish brown, strongly acid silt loam about 3 inches thick. The subsurface layer is brown, strongly acid silt loam about 4 inches thick. The subsoil is strong brown and yellowish red, very strongly acid silty clay loam. The next layer is a compact and brittle fragipan. It is yellowish brown, very strongly acid silt loam in the upper part and strong brown, mottled, very strongly acid loam in the lower part. The next layer to a depth of about 60 inches is yellowish red, mottled, very strongly acid sandy clay loam.

Water and air move through the upper part of this soil at a moderate rate and through the lower part at a moderately slow rate. Water runs off the surface at a medium rate. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. A seasonal high water table is about 1-1/2 to 3 feet below the surface during January through March of most years. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil has moderate shrink-swell potential in the subsoil.

Typically, the Smithdale soil has a surface horizon of dark yellowish brown, strongly acid fine sandy loam about 4 inches thick. The subsoil to a depth of about 60 inches is red, very strongly acid sandy clay loam in the upper part and yellowish red, very strongly acid sandy clay loam and sandy loam in the lower part. In places, the surface layer has been eroded away.

Water and air move through this soil at a moderate rate. Runoff is very rapid, and the hazard of water erosion is very severe. This soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. The shrink-swell potential is low.

Included with these soils in mapping are many small areas of Guyton, Kisatchie, and Loring soils. The poorly drained Guyton soils are in drainageways and are grayish throughout. Kisatchie soils are on some of the steep side slopes and are underlain by siltstone or sandstone. Loring soils are on narrow, gently sloping parts of ridgetops and contain less sand in the fragipan than the Providence soil. Also included are small areas of soils in narrow drainageways that are similar to Guyton soil except that they have a browner subsoil. Included in places are Oula and Smithdale soils that have slopes of more than 40 percent. Also included are small areas of soils on side slopes that are similar to Kisatchie soil except that they are underlain by sandstone at a depth ranging from 10 to 20 inches below the surface. The included soils make up about 28 percent of the map unit.

All of the acreage of the soils in this map unit is in woodland. It is used for timber production and as habitat for wildlife.

The soils in this map unit are moderately well suited to woodland. The Oula soil has moderately high potential for the production of loblolly pine, and the Providence and Smithdale soils have high potential. The main concerns in producing and harvesting timber are steepness of slope and minimizing the risk of erosion. Conventional methods of planting and harvesting trees are difficult to use because of the steepness of slope and presence of gullies. Because the surface layer of the Oula soil is sticky when wet, the use of equipment is limited during wet periods.

These soils produce habitat for deer, squirrel, rabbit, turkey, and many other woodland wildlife. Habitat for

wildlife can be improved by leaving oaks and other mast-producing trees along drainageways when harvesting timber.

The soils in this map unit are poorly suited to urban and recreational development, homesites, cropland, and pastureland. The slopes are generally too steep for these uses.

Oula and Smithdale soils are in capability subclass VIIe, and Providence soil is in capability subclass VIe. Oula soil is in woodland group 3c, Providence is in 2o, and Smithdale is in 2r.

OP—Oula-Providence association, 5 to 25 percent slopes. The well drained Oula soil and moderately well drained Providence soil are in a regular and repeating pattern on uplands. The landscape is narrow, moderately sloping to strongly sloping ridgetops and moderately steep side slopes. It is dissected by many narrow drainageways. In places, there are eroded spots, shallow gullies, and outcrops of siltstone and sandstone on the surface.

The mapped areas range from 100 to several hundred acres and are about 38 percent Oula soil and 33 percent Providence soil. The Oula soil is on side slopes. Slopes range from 12 to 25 percent. The Providence soil is on narrow ridgetops. Slopes range from 5 to 12 percent.

Typically, the Oula soil has a surface layer of dark grayish brown, strongly acid silt loam about 3 inches thick. The subsoil is very strongly acid or strongly acid silty clay. It is light yellowish brown in the upper part and light brownish gray in the lower part. The underlying material to a depth of about 60 inches is light brownish gray, strongly acid clay. In some places, the surface layer is very fine sandy loam. In other places, it has been eroded away.

Water and air move through this soil very slowly. Runoff is rapid, and the hazard of water erosion is severe. Oula soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. It has high shrink-swell potential.

Typically, the Providence soil has a surface layer of very dark grayish brown, medium acid silt loam about 3 inches thick. The subsurface layer is grayish brown, strongly acid silt loam about 4 inches thick. The subsoil is strongly acid or very strongly acid silty clay loam. It is yellowish brown in the upper part and strong brown in the lower part. The next layer is a yellowish brown, firm and brittle, fragipan. It is very strongly acid loam and clay loam. The next layer to a depth of about 60 inches is brown, very strongly acid sandy clay loam.

Water and air move through the upper part of this soil at a moderate rate and through the lower part at a moderately slow rate. Water runs off the surface at a medium rate. The hazard of erosion is severe. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. Water is perched above the fragipan from 1-1/2 to 3 feet below the surface during January through March of most years.

Included with these soils in mapping are many large areas of Smithdale soils and a few small areas of Guyton, Kisatchie, Loring, and Lucy soils. Smithdale soils are on side slopes and are reddish and loamy throughout. Guyton soils are in drainageways and are grayish throughout. Kisatchie soils are on side slopes and are underlain by siltstone and sandstone. Loring soils are on small, gently sloping parts of ridgetops and have a fragipan that contains less sand than the fragipan in the Providence soil. Lucy soils are on side slopes and have a sandy surface and subsurface layer over a loamy subsoil. Also included are small areas of soils in drainageways that are similar to the Guyton soil except that they have a browner subsoil. The Smithdale soils make up about 13 percent of the map unit, and the included soils together make up about 29 percent of the map unit.

Most of the acreage of the soils in this map unit is in woodland. A small acreage is used as homesites or pastureland.

The soils in this map unit are well suited to woodland. Oula soils have moderately high potential for the production of loblolly pine, and Providence soils have high potential for this use. The main concerns in producing and harvesting timber are steepness of slope and minimizing the risk of erosion. Conventional methods of planting and harvesting trees can be used in most areas, but they are difficult to use in the steeper areas. Because the clayey surface layer of the Oula soil is sticky when wet, the use of equipment is limited during wet periods.

These soils produce habitat for deer, squirrel, rabbit, and other species of woodland wildlife. Habitat for wildlife can be improved by leaving den and mast-producing trees along drainageways when harvesting timber and during site preparation for tree planting. Prescribed burning on a 3-year rotation among several small tracts of land can increase the amount of palatable deer browse and seed-producing plants for use by quail and turkey.

The soils in this map unit are somewhat poorly suited to pastureland and poorly suited to cropland. The main limitation is steepness of slope. The slopes are generally too steep and the hazard of erosion is too severe for use as cropland. Seedbed preparation for pasture plants need to be on the contour or across the slope if practical. The main suitable pasture plants are Pensacola bahiagrass, common bermudagrass, crimson clover, and ryegrass. Native grasses are best suited to the more steeply sloping areas where seedbed preparation is difficult. Fertilizer and lime are needed for optimum growth of grasses and legumes.

The soils in this map unit are poorly suited to homesites, recreational development, and most other urban uses. The main limitations are steepness of slope,

high shrink-swell potential, very slow and moderately slow permeability, and low strength for roads. Erosion is a severe hazard. Only the part of the site that is used for construction should be disturbed. Access roads need to be designed to control surface runoff and help stabilize cut slopes. Moderately slow and very slow permeability of the soils increase the possibility of failure of septic tank absorption fields. Effluent from absorption fields can surface downslope and create a hazard to health. Absorption lines need to be installed on the contour. Roads need to be designed to offset the limited ability of the soils to support a load. Buildings and roads need to be designed to offset the effects of shrinking and swelling of the soils.

The soils in this map unit are in capability subclass VIe. Oula soil is in woodland group 3c, and Providence soil is in 2o.

Pa—Perry silty clay loam. This level, poorly drained soil is in low positions on natural levees of the Ouachita River and other former channels and distributaries of the Arkansas River. It is subject to rare flooding. The mapped areas are irregular in shape and range from 20 to 400 acres. Slope is less than 1 percent.

Typically, the surface layer is grayish brown, silty clay loam about 4 inches thick. The subsoil is gray, mottled, strongly acid clay in the upper part and dark reddish gray slightly acid clay in the lower part. The underlying material to a depth of about 60 inches is reddish brown, moderately alkaline clay.

Included with this soil in mapping are a few small areas of Hebert soils. Hebert soils are in slightly higher positions than Perry soil and are loamy throughout. Also included are small areas of Perry soils that have a silt loam or clay surface layer. The included soils make up about 15 percent of the map unit.

Water and air move through this Perry soil very slowly. Water runs off the surface very slowly. This soil has medium fertility. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April of most years. Adequate water is available to plants in most years. The surface layer of this soil remains wet for long periods after heavy rains. This soil has very high shrink-swell potential. It is subject to long or very long periods of flooding. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. Flood waters typically are 1/2 foot to 3 feet deep. Flood duration can exceed 30 days.

Most of the acreage of this soil is in cropland. A small acreage is in woodland, pastureland, or used for homesites.

This soil is moderately well suited to cultivated crops. It is limited mainly by wetness and poor tilth. The main suitable crops are soybeans and grain sorghum. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and soil tilth and help to maintain content of organic matter. Flooding can be controlled by levees, channels, and pumps. Crops respond well to lime and fertilizer.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are common bermudagrass, tall fescue, dallisgrass, improved bermudagrass, white clover, and ryegrass. Excessive water on the surface can be removed by shallow ditches. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of eastern cottonwood, sweetgum, and water oak. The main concerns in producing and harvesting timber are severe equipment use limitations and moderately high seedling mortality because of wetness. Only trees that are water tolerant should be planted. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This soil is poorly suited to homesites, recreational development, and most other urban uses. The main limitations are wetness, very slow permeability, low strength for roads, very high shrink-swell potential, and the hazard of flooding. Major flood control structures and local drainage systems are needed. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and very slow permeability, septic tank absorption fields do not function properly during rainy periods. Buildings and roads can be designed to offset the effects of shrinking and swelling. Homes can be built on mounds of properly designed soil material above flood elevations; however, access may be restricted during periods of high water.

This Perry soil is in capability subclass IIIw and in woodland group 2w.

Pd—Perry clay, occasionally flooded. This level, poorly drained soil is in low positions on natural levees of the Ouachita and Boeuf Rivers and other former channels and distributaries of the Arkansas River. The mapped areas are irregular in shape and range from 20 to 500 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, very strongly acid clay about 5 inches thick. The subsoil is mottled, very strongly acid or slightly acid clay. It is gray in the upper and middle parts and reddish brown in the

lower part. The underlying material to a depth of about 60 inches is reddish brown, moderately alkaline clay.

Included with this soil in mapping are a few small areas of Alligator and Hebert soils. Alligator soils are in slightly lower positions than Perry soil and are gray throughout. Hebert soils are in higher positions than Perry soil and are loamy throughout. Also included are small areas of Perry silty clay loam. A few small areas of soils in this map unit flood more or less often than occasionally. The included soils make up about 15 percent of the map unit.

Water and air move through this Perry soil very slowly. Water runs off the surface very slowly. This soil has medium fertility. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April of most years. Adequate water is available to plants in most years. This soil dries slowly after heavy rains. It has very high shrink-swell potential. This soil is subject to brief to very long periods of flooding. Flooding occurs less often than 2 years out of 5 during the cropping season and more often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 5 feet deep, and the depth exceeds 10 feet in places. Flood duration can exceed 60 days.

Most of the acreage of this soil is in cropland. A small acreage is in woodland, pastureland, or homesites.

This soil is somewhat poorly suited to cultivated crops. It is limited mainly by wetness, poor tilth, and the hazard of flooding. The main suitable crops are soybeans and grain sorghum. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and tilth and help to maintain content of organic matter. Flooding can be controlled by levees, channels, and pumps. Flood waters generally recede in time to plant a short-season crop. Reduced yields as a result of late planting is common, and crops are damaged by flooding late in summer in some years. Crops respond well to lime and fertilizer.

This soil is moderately well suited to woodland. It has high potential for the production of eastern cottonwood, sweetgum, and water oak. The main concerns in producing and harvesting timber are flooding and wetness. Because the clay surface layer is sticky when wet, the use of equipment is difficult during wet periods. Only trees that can tolerate seasonal wetness should be planted.

This soil is somewhat poorly suited to pasture. The main limitations are wetness and the hazard of flooding. The main suitable pasture plant is common bermudagrass. Excessive water on the surface can be removed by shallow ditches. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is poorly suited to recreational and urban development. It is not suited to use as homesites. The main limitations are wetness, very slow permeability, low strength for roads, very high shrink-swell potential, and the hazard of flooding. Major flood control structures and local drainage systems are needed.

This Perry soil is in capability subclass IVw and in woodland group 2w.

Pe—Perry clay, frequently flooded. This level, poorly drained soil is in low positions on natural levees of the Ouachita and Boeuf Rivers and other former channels and distributaries of the Arkansas River. The mapped areas are irregular in shape and range from 20 to 300 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, medium acid clay about 8 inches thick. The subsoil is gray, mottled, strongly acid clay. The underlying material to a depth of about 60 inches is reddish brown, moderately alkaline clay.

Included with this soil in mapping are a few small areas of Alligator soils. Alligator soils are in slightly lower positions than Perry soil and are gray throughout. Also included are small areas of Perry silty clay loam and Perry clay, occasionally flooded. The included soils make up about 10 percent of the map unit.

Water and air move through this Perry soil very slowly. Water runs off the surface very slowly. This soil has medium fertility. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. This soil has very high shrink-swell potential. It is subject to very long periods of flooding. Flooding occurs more often than 2 times in 5 years during the cropping season and on a yearly basis. Flood waters typically are 1 foot to 8 feet deep, and the depth exceeds 15 feet in places. Flood duration can exceed 90 days.

Most of the acreage of this soil is in cropland. A small acreage is in woodland.

This soil is poorly suited to cultivated crops. It is limited mainly by wetness, poor tilth, and the hazard of flooding. Only short-season crops, such as soybeans and grain sorghum, are suited. Flooding can be controlled by levees, channels, and pumps. A drainage system is needed for most cultivated crops and pasture plants. Maintaining crop residue on or near the surface reduces runoff, improves tilth, and helps to maintain organic matter content. Most crops and pasture plants respond well to lime and fertilizer. Reduced crop production as a result of late planting is to be expected. In many years, flood waters do not recede in time to plant a short-season crop. In other years, crops are damaged by summer flooding.

This soil is somewhat poorly suited to pasture. Common bermudagrass and native grasses are the best suited pasture plants. Cattle need to be moved to protected areas or pastures at higher elevation during flood periods.

This soil is moderately well suited to woodland. It has moderately high potential for the production of eastern cottonwood, green ash, water oak, and water hickory. The main concerns in producing and harvesting timber are flooding and wetness. Only trees that can tolerate seasonal wetness should be planted. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This soil is poorly suited to recreational and urban development. It is not suited to use as homesites. The main limitations are very high shrink-swell potential, wetness, low strength for roads, very slow permeability, and the hazard of flooding.

This Perry soil is in capability subclass Vw and in woodland group 3w.

Pg—Pits, gravel. This miscellaneous area consists of open excavations from which gravel and sand have been removed. These pits are mainly in areas of Smithdale soils.

Gravel pits are pits from which gravelly material has been excavated for use in roads, driveways, and parking areas. Some sand is also obtained from these pits. The sand is used as a mixture for hot mix, concrete, and mortar sand. A mixture of sand, clay, and gravel, locally called "pit run," is also used as a building material. The gravel layers are as thick as 35 feet.

Included in this map unit are areas of abandoned pits. These areas consist of pits and spoil banks that are 20 to 25 feet high. The surface is generally a mixture of coarse sands and gravel. The reaction is extremely acid or very strongly acid.

Most areas of this map unit are barren of vegetation. A few low quality trees and sparse stands of grass are on a few of the abandoned pits.

Gravel pits are generally not suited to cropland, woodland, pastureland, urban development, or recreational uses.

This map unit is not in a capability subclass or woodland group.

Pr—Providence silt loam, 1 to 6 percent slopes. This gently sloping, moderately well drained soil is on convex side slopes and wide ridgetops on uplands. The mapped areas are irregular in shape and range from 20 to several hundred acres. Slopes are generally long and smooth.

Typically, the surface layer is dark gray, strongly acid silt loam about 3 inches thick. The subsurface layer is dark brown, very strongly acid silt loam about 4 inches thick. The subsoil is strong brown, very strongly acid silty clay loam in the upper part; yellowish red, strongly acid silty clay loam in the middle part; and strong brown, strongly acid silt loam in the lower part. The next layer is a compact and brittle fragipan. It is strong brown, strongly acid silt loam in the upper part and dark yellowish brown, strongly acid loam in the lower part. The underlying material to a depth of about 60 inches is brown, very strongly acid loam.

Included with this soil in mapping are a few small areas of Loring and Oula soils. Loring soils are in positions similar to those of the Providence soil, and they contain less sand in the fragipan. Oula soils are on lower side slopes and are clayey throughout. Also included are small areas of soils in level positions that are similar to the Providence soil except that they have gray mottles in the upper part of the subsoil. Included in places are small areas of Providence soils that have slopes of 6 to 8 percent. The included soils make up about 20 percent of the map unit.

Water and air move through the upper part of this Providence soil at a moderate rate and through the fragipan at a moderately slow rate. Water runs off the surface at a slow to medium rate. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. A seasonal high water table is about 1-1/2 to 3 feet below the surface during January through March of most years. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is in woodland. A small acreage is used for homesites or pastureland.

This soil is well suited to woodland. It has high potential for the production of loblolly pine, sweetgum, and water oak. This soil has few limitations for woodland use and management.

This soil is moderately well suited to homesites and recreational and urban development. The main limitations are wetness and moderately slow permeability. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and moderately slow permeability, septic tank absorption fields do not function properly during rainy periods.

This soil is well suited to pasture. The main suitable pasture plants are improved bermudagrass, Pensacola bahiagrass, common bermudagrass, crimson clover, and ryegrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is moderately well suited to cultivated crops. The main limitations are slope and moderately high levels of exchangeable aluminum in the root zone. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content.

Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Limiting tillage for seedbed preparation and weed control reduces runoff and helps to control erosion. All tillage needs to be on the contour or across the slope. Crops respond well to lime and fertilizer that are designed to overcome the medium fertility and reduce the moderately high levels of exchangeable aluminum.

This Providence soil is in capability subclass IIIe and in woodland group 2o.

Ra—Rilla silt loam. This level, well drained soil is on natural levees of the Ouachita River and other former channels and distributaries of the Arkansas River. It is subject to rare flooding. The mapped areas are generally long and narrow and range from 10 to 200 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark brown, very strongly acid silt loam about 6 inches thick. The subsoil is reddish brown and yellowish red silt loam. It is extremely acid in the upper part, very strongly acid in the middle part, and strongly acid in the lower part. The underlying material to a depth of about 60 inches is reddish brown, medium acid silty clay loam.

Included with this soil in mapping are a few small areas of Hebert and Sterlington soils. Hebert soils are in slightly lower positions and are grayer in the upper part of the subsoil than Rilla soil. The Sterlington soils are in higher positions than Rilla soil and contain less clay than the subsoil. The included soils make up about 15 percent of the map unit.

Water and air move through this Rilla soil at a moderate rate. Water runs off the surface slowly. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. It dries quickly after rains. A seasonal high water table fluctuates between about 4 and 6 feet below the surface during December through April. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil is subject to brief to very long periods of flooding. Flooding occurs less than 1 time in 10 years during the cropping season and on a yearly basis. Flood waters typically are 1/2 foot to 2 feet deep, and the depth exceeds 3 feet in places. Flood duration can exceed 30 days. This soil has moderate shrink-swell potential.

Most of the acreage of this soil is in cropland. A small acreage is in woodland, pastureland, or homesites.

This soil is well suited to cultivated crops. It has few limitations to this use. Suitable crops are cotton, corn, soybeans, grain sorghum, and truck crops. Soybeans is the main crop. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Most crops respond well to lime and fertilizers designed to overcome medium fertility and reduce the moderately high levels of exchangeable aluminum. In flood years, water generally recedes in time to plant a short-season crop.

This soil is well suited to pasture. It has few limitations for this use. The main suitable pasture plants are improved bermudagrass, common bermudagrass, white clover, and Pensacola bahiagrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland; but because it is also suited to cropland, most areas have been cleared for use as cropland or pastureland. It has few limitations to woodland management. This soil has high potential for the production of hardwood trees.

This soil is poorly suited to homesites, recreational development, and most other urban uses. The main limitations are moderate shrink-swell potential, low strength for roads, wetness, and the hazard of flooding. Major flood control structures and local drainage systems are needed. Roads need to be designed to offset the limited ability of the soil to support a load. The effects of wetness and moderate permeability on septic tank absorption fields can be partly overcome by increasing the size of the absorption field. Homes can be built on mounds of properly designed soil material above flood elevations; however, access may be restricted during periods of high water.

This Rilla soil is in capability class I and in woodland group 2o.

Rn—Roxana very fine sandy loam. This well drained, level soil is in high positions on natural levees of the Red River. It is subject to rare flooding. The mapped areas range from about 50 to 400 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is yellowish red, mildly alkaline very fine sandy loam about 6 inches thick. The underlying material to a depth of about 67 inches is yellowish red and reddish yellow, calcareous, moderately alkaline very fine sandy loam.

Included with this soil in mapping are a few small areas of Norwood soils. Norwood soils are in slightly lower positions and contain more clay in the subsoil than Roxana soil. The included soils make up about 15 percent of the map unit.

Water and air move through this Roxana soil at a moderate rate. Water runs off the surface slowly. Plants are damaged by lack of water during dry periods in

summer and fall of some years. This soil dries quickly after rains. It has high fertility. The shrink-swell potential is low. This soil has a seasonal high water table that fluctuates between 4 and 6 feet below the surface during December to April. It is subject to rare flooding after unusually intense rainstorms or when protection levees fail. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis.

Most of the acreage of this soil is in cropland. A small acreage is used for homesites or woodland.

This soil is well suited to cultivated crops. It has few limitations to this use. Suitable crops are soybeans, cotton, corn, wheat, and grain sorghum. Soybeans is the main crop. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. A tillage pan forms easily if this soil is tilled when wet. Chiseling or subsoiling can be used to break up the pan. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter help to maintain fertility, soil tilth, and content of organic matter.

This soil is well suited to woodland; but because it is also suited to cropland, most areas have been cleared for use as cropland or pastureland. It has few limitations for woodland management and has very high potential for the production of hardwood trees.

This soil is poorly suited to most urban and recreational uses. The main limitations are wetness, moderate permeability, and the hazard of flooding. Where septic tanks are installed, the effects of wetness and moderate permeability can be partly overcome by increasing the size of the absorption field. Protection from flooding is needed.

This Roxana soil is in capability class I and in woodland group 1o.

Rp—Roxana very fine sandy loam, frequently flooded. This well drained, gently undulating soil is on sandbars and in other low positions along the Red River. The mapped areas are generally long and narrow and range from 10 to 200 acres. Slopes are short and complex and range from 0 to 3 percent.

Typically, the surface layer is brown, moderately alkaline very fine sandy loam about 5 inches thick. The underlying material to a depth of about 88 inches is moderately alkaline very fine sandy loam or silt loam. It is dark brown in the upper part, reddish brown in the middle part, and yellowish red in the lower part.

Included with this soil in mapping are a few small areas of Norwood soils. Norwood soils are in higher positions and contain more clay in the subsoil than Roxana soil. Also included are small areas of Roxana soils that are subject to occasional flooding. The included soils make up about 15 percent of the map unit.

Water and air move through this Roxana soil at a moderate rate. Water runs off the surface slowly. This soil has high fertility. It dries quickly after rains. This soil is subject to brief to very long periods of flooding that generally occur in winter, spring, and early in summer. However, flooding can occur any time when flood control structures upstream are opened and allowed to drain. It occurs about 1 to 4 times each year on a yearly basis and during the cropping season. Flood waters typically are 5 to 10 feet deep, and the depth exceeds 20 feet in places. Flood duration can exceed 90 days. This soil has low shrink-swell potential. It has a seasonal high water table 4 to 6 feet below the surface during December to April.

Most of the acreage of this soil is in woodland. It is used for timber production and as habitat for wildlife.

This soil is moderately well suited to woodland. It has very high potential for the production of eastern cottonwood and American sycamore. However, woodland management is difficult because of frequent flooding. Trees should be water tolerant, and they need to be planted or harvested during dry periods.

This soil is not suited to homesites. It is poorly suited to most other urban uses and to pastureland and cropland. Unless flood protection is provided, the hazard of flooding is generally too severe for these uses.

This Roxana soil is in capability subclass Vw and in woodland group 1o.

Sh—Sharkey clay. This level, poorly drained soil is in low positions on natural levees of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. It is subject to rare flooding. The mapped areas range from about 10 to several thousand acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, medium acid clay about 4 inches thick. The subsoil is gray, mottled clay. It is medium acid in the upper part, slightly acid and neutral in the middle part, and mildly alkaline in the lower part. The underlying material to a depth of about 60 inches is gray, mottled, mildly alkaline clay.

Included with this soil in mapping are a few small areas of Dundee, Fausse, and Tensas soils. Dundee soils are in higher positions than Sharkey soil and are loamy throughout. Fausse soils are in lower positions than Sharkey soil and are wet most of the time. Tensas soils are in slightly higher positions than Sharkey soil and are loamy in the lower part of the subsoil. Also included are small areas of Sharkey soils that have slopes of 1 to 3 percent, a few large areas in the northeast part of the parish that are subject to occasional flooding during the cropping season, and a few small to large areas that are adequately protected from flooding by levees. The included soils make up about 10 percent of the map unit.

Water and air move through this Sharkey soil very slowly. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. This soil has high fertility. Adequate water is available to plants in most years. A seasonal high water table fluctuates

between a depth of about 2 feet and the soil surface during December through April. The soil has very high shrink-swell potential. Flooding occurs less than 1 time in 10 years during the cropping season and less often than 2 years out of 5 on a yearly basis. Flood waters typically are 1/2 foot to 2 feet deep, and the depth exceeds 5 feet in places. Flood duration can exceed 30 days.

Most areas of this soil are used for cultivated crops. Soybeans is the principal crop. A few areas are used as woodland, pastureland, or for homesites.

This soil is moderately well suited to cultivated crops. It is limited mainly by wetness and poor tilth. Soybeans, cotton, rice, grain sorghum, and wheat are the main crops (fig. 6). This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Maintaining crop residue on or near the surface reduces runoff, improves tilth, and helps to maintain organic matter content. Most crops and pasture plants respond well to fertilizer. Lime is generally not needed. In flood years, water generally recedes in time to plant a short-season crop.

This soil is moderately well suited to pasture. The main limitations are wetness and the clay surface layer. Grazing when the soil is wet results in compaction of the surface layer. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Suitable pasture plants are common bermudagrass, improved bermudagrass, tall fescue, white clover, dallisgrass, and ryegrass. Fertilizer is generally needed for optimum growth of pasture grasses. During flood periods, cattle

Figure 6.—Grain sorghum, ready to be harvested, in an area of Sharkey clay.

need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland. It has high potential for the production of water oak, Nuttall oak, and sweetgum. The main concerns in producing and harvesting timber are severe equipment use limitations and moderately high seedling mortality because of wetness. Only trees that can tolerate seasonal wetness should be planted. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is poorly suited to urban development and homesites. It has severe limitations for building sites, local roads and streets, and most sanitary facilities. The main limitations are wetness, low strength for roads, very high shrink-swell potential, and very slow permeability. Flooding is a hazard in unprotected areas. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Very slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. Buildings and roads can be designed to offset the effects of shrinking and swelling. In areas not protected from flooding, homes can be built on properly designed mounds of soil material above flood elevations; however, access may be restricted during periods of high water.

This soil is poorly suited to recreational development. The main limitations are wetness, very slow permeability, a clayey surface layer, and the hazard of flooding. Good drainage is needed for most recreational uses. Spreading loamy fill material on the surface improves areas used as playgrounds.

This Sharkey soil is in capability subclass IIIw and in woodland group 2w.

Sk—Sharkey clay, occasionally flooded. This level, poorly drained soil is in low positions on natural levees of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. The mapped areas are irregular in shape and range from 100 to 2,000 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, medium acid clay about 4 inches thick. The subsoil is gray, mottled clay. It is medium acid in the upper part and neutral in the lower part. The underlying material to a depth of about 60 inches is gray, mottled, mildly alkaline clay.

Included with this soil in mapping are a few small areas of Dundee, Fausse, and Tensas soils. Dundee soils are in higher positions than Sharkey soil and are loamy throughout. Fausse soils are in lower positions than Sharkey soil and are wet most of the time. Tensas soils are in slightly higher positions than Sharkey soil and are loamy in the lower part of the subsoil. Also included are a few small areas of soils that are similar to Sharkey soil except that they are underlain by reddish clay between a depth of 36 and 60 inches. Included in places are Sharkey soils that are subject to frequent or rare flooding. The included soils make up about 20 percent of the map unit.

Water and air move through this Sharkey soil very slowly. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. This soil has high fertility. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. This soil has very high shrink-swell potential. Adequate water is available to plants in most years. This soil is subject to prolonged periods of flooding. Flooding occurs less often than 2 years out of 5 during the cropping season and more often than 2 years out of 5 on a yearly basis. Flood waters typically are 2 to 5 feet deep, and the depth exceeds 10 feet in places. Flood duration can exceed 60 days.

Most of the acreage of this soil is used for cultivated crops. A small acreage is in woodland and pastureland.

This soil is somewhat poorly suited to cultivated crops. It is limited mainly by flooding, wetness, and poor tilth. Suitable crops are soybeans and grain sorghums. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Flooding can be controlled by levees, channels, and pumps. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and tilth and help to maintain content of organic matter. In flood years, water generally recedes in time to plant a short-season crop. Reduced crop production as a result of late planting is common.

This soil is somewhat poorly suited to pasture. The main limitations are wetness and the hazard of occasional flooding. The main suitable pasture plant is common bermudagrass. Suitable grazing periods are limited by wetness and flooding. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is moderately well suited to woodland. It has high potential for the production of green ash, overcup oak, water hickory, and sugarberry. The main concerns in producing and harvesting timber are the severe equipment use limitations and seedling mortality because of wetness and flooding. Conventional methods of harvesting generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is not suited to homesites, and it is poorly suited to urban and recreational development. It is limited mainly by flooding, wetness, very high shrink-swell, very slow permeability, and low strength for roads. Drainage and protection from flooding are needed to make this soil suitable for most urban uses.

This Sharkey soil is in capability subclass IVw and in woodland group 2w.

Sm—Sharkey clay, frequently flooded. This level, poorly drained soil is in low positions on natural levees of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. The mapped areas are irregular in shape and range from 100 to 2,000 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, slightly acid clay about 9 inches thick. The subsoil is gray, mottled clay. It is slightly acid in the upper part and neutral in the middle and lower parts. The underlying material to a depth of about 60 inches is gray, mottled, neutral silty clay.

Included with this soil in mapping are a few small areas of Fausse and Tensas soils. Fausse soils are in lower positions than Sharkey soil and are wet most of the time. Tensas soils are in slightly higher positions than Sharkey soil and are loamy in the lower part of the subsoil. Also included are a few small areas of soils that are similar to Sharkey soil except that they have a surface layer of reddish clay. Included in places are a few small areas of Sharkey soils that are subject to occasional flooding. The included soils make up about 20 percent of the map unit.

Water and air move through this Sharkey soil very slowly. Water runs off the surface very slowly. This soil has high fertility. Adequate water is available to plants in most years. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. This soil has very high shrink-swell potential. It is subject to prolonged periods of flooding in December through July. Flooding occurs more often than 2 years out of 5 during the cropping season and on a yearly basis. Flood waters typically are 5 to 10 feet deep, and the depth exceeds 15 feet in places. Flood duration can exceed 90 days.

Most of the acreage of this soil is in woodland. It is used primarily as habitat for wildlife and for timber production. A small acreage is in cropland.

This soil is moderately well suited to woodland. It has moderately high potential for the production of overcup oak, black willow, and water hickory. The main concerns in producing and harvesting timber are the severe equipment use limitations and seedling mortality because of wetness and flooding. Conventional methods of harvesting generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is poorly suited to cultivated crops and pastureland. It is limited mainly by frequent flooding. Soybeans and grain sorghum are the main crops. Common bermudagrass and native grasses are the best suited pasture plants. Flooding can be controlled by levees, dikes, and pumps. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. Crop residue left on or near the surface improves tilth and helps to maintain content of organic matter. Reduced crop production as a result of late planting is to be expected in most years. In some years, flood waters do not recede in time to plant a short-season crop. In other years, crops are damaged by floods late in summer. Where used for pasture, cattle need to be moved to protected areas or pastures above flood elevations during flood periods.

This soil produces habitat for deer, squirrel, rabbit, and numerous species of wetland wildlife. A part of the Saline Wildlife Management Area is in this map unit. Habitat can be improved by encouraging the growth of existing oak trees and suitable understory plants.

This soil is not suited to homesites. It is poorly suited to urban and recreational development. Drainage and protection from flooding are needed to make this soil more suitable for these uses.

This Sharkey soil is in capability subclass Vw and in woodland group 3w.

Sn—Sharkey clay, overwash. This level, poorly drained soil is in low positions on natural levees of former channels of the Mississippi River that are near the present channel of the Red River. It is subject to rare flooding during the cropping season. The mapped areas are irregular in shape and range from 100 to 500 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is reddish brown, moderately alkaline clay about 6 inches thick. The subsoil and underlying material to a depth of about 63 inches is gray, mottled, moderately alkaline clay. In places, the surface layer is silty clay loam.

Included with this soil in mapping are a few small areas of Moreland soils. Moreland soils are in slightly lower positions than Sharkey soil and are reddish throughout. Also included are a few small to large areas of soils that are adequately protected from flooding by levees. The included soils make up about 15 percent of the map unit.

Water and air move through this soil very slowly. This soil has high fertility. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. Adequate water is available to plants in most years. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. This soil is subject to flooding after unusually intense rainstorms or when levees fail. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. The surface layer of this soil is very sticky when wet and hard when dry. This soil dries slowly after heavy rains. It has very high shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. This soil is moderately well suited to cultivated crops. It is limited mainly by wetness and poor tilth. The main suitable crops are soybeans, grain sorghum, rice, cotton, wheat, and corn. Soybeans is the main crop. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. It becomes cloddy if farmed when it is too wet or too dry. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Maintaining crop residue on or near the surface reduces runoff, improves tilth, and helps to maintain organic matter content.

This soil is moderately well suited to pasture. The main limitation is wetness. Suitable pasture plants are common bermudagrass, improved bermudagrass, dallisgrass, tall fescue, and white clover. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition.

This soil is well suited to woodland. It has high potential for the production of hardwood trees. The main concerns in management are severe equipment use limitations and moderately high seedling mortality caused by wetness.

This soil is poorly suited to urban and recreational development. The main limitations are wetness, very slow permeability, very high shrink-swell, low strength for roads, and the hazard of flooding. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Because of wetness and very slow permeability, septic tank absorption fields do not function properly during rainy periods. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with material that has low shrink-swell potential. Protection from flooding is needed.

This Sharkey soil is in capability subclass IIIw and in woodland group 2w.

SP—Smithdale-Oula-Providence association, 5 to 40 percent slopes. The well drained Smithdale and Oula soils and the moderately well drained Providence soil are in a regular and repeating pattern on uplands. The landscape is very narrow, moderately sloping to strongly sloping ridgetops and moderately steep to steep side slopes (fig. 7). It is dissected by many narrow drainageways. In places, there are eroded spots, shallow to deep gullies, and outcrops of sandstone on the surface.

The mapped areas range from 100 to several hundred acres and are about 31 percent Smithdale soil, 25 percent Oula soil, and 20 percent Providence soil. Smithdale soil is on moderately steep to steep upper and middle side slopes. Slopes range from 12 to 40 percent. Oula soil is on moderately steep to steep lower side slopes. Slopes range from 12 to 40 percent. Providence soil is on moderately sloping to strongly sloping, narrow ridgetops. Slopes range from 5 to 15 percent.

Fewer observations were made in this map unit than in other areas because the steep slopes are a major limitation to the use and management of these soils. For this reason, separation of the soils would be of little value to the land user. The detail in mapping, however, is adequate for the expected use of these soils.

Typically, the Smithdale soil has a surface layer of brown fine sandy loam about 5 inches thick. The subsurface layer is yellowish brown fine sandy loam about 5 inches thick. The subsoil to a depth of about 80 inches is red sandy clay loam in the upper part, red sandy loam in the middle part, and yellowish red sandy loam in the lower part. This Smithdale soil is very strongly acid throughout.

Water and air move through this soil at a moderate rate. Runoff is very rapid, and the hazard of water erosion is very severe. This soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. The shrink-swell potential is low.

Typically, the Oula soil has a surface layer of dark grayish brown, very strongly acid very fine sandy loam about 2 inches thick. The subsoil is light brownish gray and grayish brown, extremely acid clay. The underlying material to a depth of about 74 inches is light olive brown, extremely acid and very strongly acid sandy clay loam. It contains fragments of soft sandstone.

Water and air move through this soil very slowly. Runoff is very rapid, and the hazard of water erosion is very severe. This soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. This soil has high shrink-swell potential.

Typically, the Providence soil has a surface layer of brown, medium acid silt loam about 2 inches thick. The subsurface layer is grayish brown, strongly acid silt loam about 4 inches thick. The subsoil is strongly acid or very strongly acid silty clay loam. It is strong brown in the upper and middle parts and yellowish brown in the lower part. The next layer is a yellowish brown, firm and brittle, very strongly acid fragipan. It is silt loam in the upper part and loam in the lower part. The underlying material to a depth of about 60 inches is strong brown, very strongly acid sandy clay loam. In places, the surface layer and part of the subsoil have been removed by erosion.

Water and air move through the upper part of this soil at a moderate rate and through the fragipan at a moderately slow rate. Runoff is medium, and the hazard of water erosion is severe. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. Water is perched above the fragipan at a depth of from 1-1/2 to 3 feet during January through March of most years.

Figure 7.—Steep slopes are common in areas of Smithdale-Oula-Providence association, 5 to 40 percent slopes.

Included with these soils in mapping are a few small areas of Guyton, Kisatchie, Loring, and Lucy soils. The poorly drained Guyton soils are in drainageways and are gray and loamy throughout. Kisatchie soils are on convex side slopes and are underlain by sandstone. Loring soils are on ridgetops and contain less sand in the fragipan than the Providence soil. Lucy soils are on side slopes and have a sandy surface and subsurface layer. Also included are small areas of soils in drainageways that are similar to the Guyton soil except that they are browner and do not have a seasonal high water table within 3 feet of the surface. Included in places are soils that are similar to the Providence soil except that the subsoil is very thin above the fragipan. In places, small areas of Smithdale and Oula soils are included that have slopes of 40 to 45 percent. The included soils make up about 24 percent of the map unit.

Most areas of the soils in this map unit are used as woodland and habitat for upland wildlife. A small acreage is used for homesites.

The soils in this map unit are moderately well suited to woodland. Smithdale and Providence soils have high potential for the production of loblolly pine, and Oula soil has moderately high potential. The main concern in producing and harvesting timber is steepness of slope. Conventional methods of harvesting trees can be used in the more gently sloping areas of these soils, but they are difficult to use in the steeper areas. Trees can be planted by hand or seeded aerially, or reforestation can occur through natural regeneration. Poor traction with logging equipment is common in areas where the soils have a thick, sandy surface layer.

These soils produce habitat for deer, turkey, squirrel, and other native upland wildlife. Habitat for wildlife can be improved by leaving mast-producing trees along drainageways when harvesting and during site preparation for tree planting. Prescribed burning on a 3-year rotation among several small tracts of land can increase the amount of palatable deer browse and seed-producing plants for use by quail and turkey.

The soils in this map unit are poorly suited to homesites, urban and recreational development, cropland, and pastureland. The main limitation is steepness of slope. Except for small, moderately sloping areas on ridgetops, the slopes are generally too steep for the safe operation of farm machinery.

Smithdale and Oula soils are in capability subclass VIIe, and Providence soil is in VIe. Smithdale soil is in woodland group 2r, Oula soil is in 3c, and Providence soil is in 2o.

SR—Smithdale-Lucy-Providence association, 5 to 25 percent slopes. The well drained Smithdale and Lucy soils and moderately well drained Providence soil are in a regular and repeating pattern on uplands. The landscape is narrow, moderately sloping to strongly sloping ridgetops and moderately steep to steep side slopes. It is dissected by many drainageways. In places, there are eroded spots, shallow gullies, and outcrops of sandstone on the surface.

The mapped areas range from 200 to several hundred acres and are about 51 percent Smithdale soil, 18 percent Lucy soil, and 16 percent Providence soil. The Smithdale and Lucy soils are on moderately steep and steep, upper and middle side slopes. Slopes range from 12 to 25 percent. The Providence soil is on the moderately sloping and strongly sloping ridgetops. Slopes range from 5 to 15 percent.

Fewer observations were made in this map unit than in other areas because the steep slopes are a major limitation to the use and management of these soils. For this reason, separation of the soils would be of little value to the land user. The detail in mapping, however, is adequate for the expected use of these soils.

Typically, the Smithdale soil has a surface layer of dark grayish brown, strongly acid fine sandy loam about 2 inches thick. The subsurface layer is pale brown, strongly acid fine sandy loam about 3 inches thick. The subsoil to a depth of about 60 inches is yellowish red, very strongly acid sandy clay loam in the upper part and sandy loam in the lower part.

Water and air move through this soil at a moderate rate. Runoff is rapid, and the hazard of water erosion is severe. This soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. The shrink-swell potential is low.

Typically, the Lucy soil has a surface layer of very dark grayish brown, strongly acid loamy fine sand about 4 inches thick. The subsurface layer is pale brown, strongly acid, loamy fine sand about 26 inches thick. The subsoil to a depth of about 60 inches is red, very strongly acid sandy clay loam.

Water and air move through the upper part of this soil rapidly and through the lower part at a moderate rate. Runoff is slow, and the hazard of water erosion is moderate. This soil has low fertility and high levels of exchangeable aluminum that are potentially toxic to some plants.

Typically, the Providence soil has a surface layer of very dark grayish brown, medium acid silt loam about 2 inches thick. The subsurface layer is brown, strongly acid silt loam about 4 inches thick. The subsoil is strong brown, very strongly acid silty clay loam. The next layer is a strong brown, firm and brittle, strongly acid silt loam and clay loam fragipan. The next layer to a depth of about 60 inches is strong brown, very strongly acid sandy clay loam. In places, the surface layer and part of the subsoil have been removed by erosion.

Water and air move through this soil at a moderate rate above the fragipan and at a moderately slow rate in the fragipan. Runoff is medium, and the hazard of water erosion is severe. This soil has medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some plants. Water is perched above the fragipan about 1-1/2 to 3 feet below the surface during January through March of most years. This soil has moderate shrink-swell potential.

Included with these soils in mapping are many small areas of Guyton, Kisatchie, and Loring soils. The poorly drained Guyton soils are in drainageways and are gray throughout. Kisatchie soils are on some of the lower side slopes and are underlain by sandstone or siltstone. Loring soils are on gently sloping parts of the ridgetops and have a fragipan that contains less sand than the fragipan in the Providence soil. Also included are small areas of soils in drainageways that are similar to the Guyton soil except that they do not have a seasonal high water table that rises above a depth of about 3 feet. The included soils make up about 15 percent of the map unit.

Most areas of the soils in this map unit are used as woodland and habitat for woodland wildlife. A small acreage is used for homesites.

The soils in this map unit are moderately well suited to woodland. The Smithdale and Providence soils have high potential for the production of loblolly pine, and the Lucy soil has moderately high potential for this use. The main concerns in producing and harvesting timber are steepness of slope, the sandy surface layer, and gullies that limit the use of equipment. Because of droughtiness, seedling mortality is severe in areas of the Lucy soil. Planting trees on the contour helps to control erosion.

These soils produce habitat for deer, turkey, squirrel, and other native wildlife. Habitat for wildlife can be improved by leaving mast-producing trees along drainageways when harvesting and during site preparation for tree planting. Prescribed burning on a 3-year rotation among several small tracts of land can increase the amount of palatable deer browse and seed-producing plants for use by quail and turkey.

The soils in this map unit are somewhat poorly suited to pastureland and poorly suited to cropland. The main limitation is steepness of slope. Droughtiness is an additional limitation in areas of the Lucy soil. Slopes are generally too steep and the hazard of erosion too severe for use as cropland. All adapted pasture plants can be grown, but because of the hazard of erosion, bunch-type species planted alone generally are not suitable.

Smithdale soil is in capability subclass VIIe, Lucy soil is in VIs, and Providence soil is in VIe. Smithdale soil is in woodland group 2r, Lucy soil is in 3s, and Providence soil is in 2o.

Ss—Sostien clay, occasionally flooded. This very gently sloping, poorly drained soil formed in clayey soil material that was dredged and pumped from bottom land areas during the construction of the Jonesville Lock and Dam. The Jonesville Lock and Dam is on the Black River and the Catahoula Lake Diversion Channel. In most places, this soil is subject to brief to very long periods of flooding. A few areas of this soil near the Jonesville Lock and Dam are protected from flooding. The mapped areas are generally rectangular or long and narrow and range from 80 to several hundred acres. Slopes are long and smooth and range from 0 to 3 percent.

Typically, the surface layer is dark gray, neutral clay about 4 inches thick. The underlying material to a depth of about 60 inches is gray, mottled, neutral clay that contains thin strata of brown very fine sandy loam. In places the underlying material contains strata of reddish clay.

Included with this soil in mapping are a few small areas of soils that are similar to the Sostien soil except that they are loamy throughout. In places, these similar soils are reddish. Also included are small areas of the Sostien soils that have slopes of 3 to 5 percent. The included soils make up about 15 percent of the map unit.

Water and air move through this Sostien soil very slowly. Water runs off the surface at a medium rate. This soil has high fertility. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. This soil has very high shrink-swell potential. The surface layer of this soil remains wet for long periods after heavy rains. This soil is subject to brief to very long periods of flooding. Flooding occurs less than 2 times in 5 years during the cropping season and more often than 2 years out of 5 on a yearly basis. Flood waters typically are 5 to 10 feet deep, and the depth exceeds 15 feet in places. Flood duration can exceed 60 days.

Most of the acreage of this soil is in woodland. A small acreage is used as pastureland or cropland.

This soil is moderately well suited to woodland. It has high potential for the production of eastern cottonwood, Nuttall oak, and black willow. The main concerns in producing and harvesting timber are wetness and flooding. Severe equipment use limitations and moderately high seedling mortality are concerns unless drainage is provided. Conventional methods of harvesting generally can be used, but their use may be limited during rainy periods, generally from December to April.

This soil is somewhat poorly suited to pasture. The main limitations are wetness and the hazard of flooding. The main suitable pasture plants are common bermudagrass, improved bermudagrass, tall fescue, dallisgrass, and white clover. Excessive water on the surface can be removed by installing a suitable drainage system. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil produces habitat for deer, rabbit, squirrel, waterfowl, and other woodland wildlife. A small acreage of this soil is in the Saline Wildlife Management Area. Habitat can be improved by continued growth of existing oak trees and suitable understory plants.

This soil is somewhat poorly suited to cultivated crops. It is limited mainly by wetness, flooding, and poor tilth. The main suitable crops are soybeans and grain sorghum. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter help to maintain fertility, soil tilth, and content of organic matter. Most crops and pasture plants respond well to fertilizer. Flood waters generally recede in time to plant a short-season crop. Reduced crop production as a result of late planting is common. In some years, crops are damaged by flooding late in summer.

The soils in this map unit are poorly suited to recreational and urban development. It is not suited to homesites. The main limitations are wetness, very high

shrink-swell potential, very slow permeability, low strength for roads, and the hazard of flooding. Because of wetness and very slow permeability, septic tank absorption fields do not perform well. Roads need to be designed to offset the limited ability of the soil to support a load. Protection from flooding is needed.

This Sostien soil is in capability subclass IVw and in woodland group 2w.

St—Sterlington silt loam. This level, well drained soil is on natural levees of the Ouachita River and other former channels and distributaries of the Arkansas River. It is subject to rare flooding. The mapped areas are generally long and narrow and range from 10 to 100 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark brown, medium acid silt loam about 7 inches thick. The subsurface layer is brown, very strongly acid very fine sandy loam about 5 inches thick. The subsoil is very strongly acid very fine sandy loam. It is reddish brown in the upper part and yellowish red in the lower part. The underlying material to a depth of about 66 inches is stratified yellowish red very fine sandy loam and reddish brown clay. It is strongly acid.

Included with this soil in mapping are a few small areas of Hebert and Rilla soils. The somewhat poorly drained Hebert soils and the well drained Rilla soils are in slightly lower positions and contain more clay in the subsoil than Sterlington soil. Also included are small areas of soils that are similar to Sterlington soil except that they have a subsoil that is browner. The included soils make up about 15 percent of the map unit.

Water and air move through this Sterlington soil at a moderate rate. Water runs off the surface slowly. This soil has medium fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Plants are damaged by lack of water during dry periods in summer and fall of some years. This soil dries quickly after heavy rains. It is subject to rare flooding. Flooding occurs less than 1 time in 10 years during the cropping season and on a yearly basis. Flood waters typically are 1/2 foot to 2 feet deep, and the depth exceeds 3 feet in places. Flood duration may exceed 30 days. This soil has low shrink-swell potential.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used for homesites or as pastureland.

This soil is well suited to cultivated crops. The main limitations are medium fertility and high levels of exchangeable aluminum in the root zone. Suitable crops are cotton, soybeans, grain sorghum, wheat, corn, and truck crops. Soybeans is the main crop. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Traffic pans develop easily but can be broken up by deep plowing or chiseling. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Most crops and pasture plants respond well to lime and fertilizer designed to overcome the medium fertility and reduce the level of exchangeable aluminum. Flood waters generally recede in time to plant a short-season crop.

This soil is well suited to pasture. It has few limitations to this use. The main suitable pasture plants are improved bermudagrass, common bermudagrass, white clover, and Pensacola bahiagrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is well suited to woodland; but because it is also suited to cropland, most areas have been cleared for use as cropland or pastureland. This soil has high potential for the production of hardwood trees. It has few limitations for woodland management.

This soil is poorly suited to homesites and most other urban uses. The hazard of flooding is the main limitation. Moderate permeability is a limitation for septic tank absorption fields. The limitation of moderate permeability can be partly overcome by increasing the size of the absorption field. Flooding can be controlled by use of major flood control structures. Homes can be built on properly designed mounds of soil material so that they are above flood elevations; however, access may be restricted during periods of high water.

This Sterlington soil is in capability class I and in woodland group 2o.

SW—Sweatman-Smithdale association, 5 to 40 percent slopes. These well drained soils are in a regular and repeating pattern on uplands. The landscape is narrow, moderately sloping to strongly sloping ridgetops and moderately steep to steep side slopes. It is dissected by many narrow drainageways. Eroded spots and shallow to deep gullies are in some areas.

The Sweatman soil is on middle and lower side slopes and makes up about 56 percent of the map unit. Slopes range from 12 to 40 percent. The Smithdale soil is on ridgetops and upper side slopes and makes up about 13 percent of the map unit. Slopes range from 5 to 25 percent.

Fewer observations were made in this map unit than in other areas because the steep slopes are a major limitation to the use and management of the soils. For this reason, separation of the soils would be of little value to the land user. The detail in mapping, however, is adequate for the expected use of these soils.

Typically, the Sweatman soil has a surface layer of very dark grayish brown and yellowish brown, very strongly acid and strongly acid fine sandy loam about 4 inches thick. The subsoil is yellowish red, very strongly acid clay in the upper part and reddish brown, very

strongly acid silty clay in the lower part. The underlying material to a depth of about 62 inches is stratified light yellowish brown shaly clay and brownish yellow very fine sandy loam. It is very strongly acid.

Water and air move through this soil moderately slowly. Runoff is rapid, and the hazard of water erosion is severe. This soil has low fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. It has moderate shrink-swell potential.

Typically, the Smithdale soil has a surface layer of dark brown, strongly acid fine sandy loam about 4 inches thick. The subsoil to a depth of about 70 inches is very strongly acid sandy clay loam. It is red in the upper part and yellowish red in the lower part.

Water and air move through this soil at a moderate rate. Runoff is very rapid, and the hazard of water erosion is severe. This soil has low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to some crops. It has low shrink-swell potential.

Included with these soils in mapping are many small areas of Alaga, Guyton, Kisatchie, Lucy, and Providence soils. Guyton soils are in drainageways and are grayish throughout. Alaga, Kisatchie, and Lucy soils are on some of the ridgetops and side slopes. Alaga soils are sandy throughout, Kisatchie soils are underlain by sandstone, and Lucy soils are sandy in the upper part of the profile and loamy in the lower part. Providence soils are on some of the ridgetops and have a fragipan. Also included are areas of soils similar to Sweatman soil except that they contain concretions of carbonates in the subsoil. The included soils make up about 31 percent of the map unit.

The soils in this map unit are mainly in woodland and are used for timber production and as habitat for woodland wildlife. A small acreage is used for homesites.

The soils in this map unit are moderately well suited to woodland. The Sweatman soil has moderately high potential for the production of loblolly pine, and Smithdale soil has high potential for this use. The main concerns in producing and harvesting timber are steepness of slope and minimizing the risk of erosion. Steepness of slope limits the kinds of equipment that can be used in forest management. Because of the steep slopes, trees need to be planted by hand or seeded aerially. Poor traction caused by the loose, sandy surface layer of the soils on some steep side slopes also limits the use of equipment.

These soils produce habitat for deer, turkey, squirrel, and other woodland wildlife. Habitat for wildlife can be improved by leaving mast-producing trees, such as beech, hickory, and oak, along drainageways when harvesting timber and during site preparation for tree planting.

The soils in this map unit are poorly suited to homesites, urban development, recreational development, cropland, and pastureland. The main limitation is steepness of slope. Slopes are too steep for the use of farm equipment. Effluent from septic tank absorption fields can surface in downslope areas and create a hazard to health. Dwellings and roads can be built, but construction is difficult and expensive.

Sweatman and Smithdale soils are in capability subclass VIIe. Sweatman soil is in woodland group 3c, and Smithdale soil is in 2r.

Ta—Tensas silty clay. This level, somewhat poorly drained soil is in intermediate positions on natural levees of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. It is subject to rare flooding. The mapped areas range from about 40 to 500 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is very dark gray, medium acid silty clay about 3 inches thick. The subsoil is grayish brown, mottled, strongly acid clay in the upper part and brown, mottled, strongly acid silty clay loam in the lower part. The underlying material to a depth of about 60 inches is brown, mottled, slightly acid silty clay loam and very fine sandy loam. In places the surface layer is clay or silty clay loam.

Included with this soil in mapping are a few small areas of Dundee and Sharkey soils. Dundee soils are in higher positions than Tensas soil and are loamy throughout. Sharkey soils are in lower positions than Tensas soil and are clayey throughout. Also included are small areas of Tensas soils that have slopes of 1 to 3 percent. Included in places are soils similar to Tensas soil except that the upper part of the subsoil is reddish. A few small to large areas of soils that are adequately protected from flooding by levees are also included. The included soils make up about 20 percent of the map unit.

Water and air move through this Tensas soil very slowly. Water runs off the surface at a medium rate. This soil has medium fertility. A seasonal high water table fluctuates between about 1 foot and 3 feet below the surface during December through April of most years. Adequate water is available to plants in most years. This soil has very high shrink-swell potential. It is subject to rare flooding after unusually severe rainstorms. Flooding occurs less often than 1 year out of 10 during the cropping season and on a yearly basis.

Most of the acreage of this soil is used for cultivated crops. A small acreage is in pastureland or woodland or is used for homesites.

This soil is moderately well suited to cultivated crops. It is limited mainly by wetness and poor tilth. Suitable crops are soybeans, cotton, corn, rice, grain sorghum, wheat, and oats. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm

equipment. Minimum tillage and returning all crop residue to the soil or regularly adding other organic matter improve fertility and tilth and help to maintain content of organic matter. Crops respond well to lime and fertilizer.

This soil is well suited to pasture. The main limitations are medium fertility and wetness. Suitable pasture plants are common bermudagrass, improved bermudagrass, tall fescue, dallisgrass, and white clover. Lime and fertilizer can overcome the medium fertility and promote good growth of forage plants. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition.

This soil is well suited to woodland. It has high potential for the production of hardwood trees. However, it has severe equipment use limitations and moderately high seedling mortality because of wetness and stickiness of the surface layer.

This soil is poorly suited to most urban uses. The main limitations are wetness, very high shrink-swell potential, very slow permeability, low strength for roads, and the hazard of flooding. Drainage and protection from flooding are needed. Roads need to be designed to offset the limited ability of the soil to support a load. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with material that has low shrink-swell potential. Because of wetness and very slow permeability, septic tank absorption fields do not function properly during rainy periods.

This soil is poorly suited to recreational development. It is limited mainly by wetness, the clay surface layer, and very slow permeability. Good drainage is needed for most recreational uses. Coating the soil with a layer of loamy material can improve the soil for use as playgrounds and camp areas.

This Tensas soil is in capability subclass IIIw and in woodland group 2w.

Te—Tensas silty clay, occasionally flooded. This level, somewhat poorly drained soil is in intermediate positions on natural levees of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. The mapped areas range from about 40 to 500 acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, medium acid silty clay about 5 inches thick. The subsoil is dark grayish brown, mottled, very strongly acid silty clay in the upper part and grayish brown, mottled, strongly acid silty clay loam in the middle and lower parts. The underlying material to a depth of about 60 inches is brown, mottled, strongly acid silt loam. In places the surface layer is clay or silty clay loam.

Included with this soil in mapping are a few small areas of Dundee and Sharkey soils. Dundee soils are in higher positions than Tensas soil and are loamy throughout. Sharkey soils are in lower positions than Tensas soil and are clayey throughout. Also included are small areas of Tensas soils that have slopes of 1 to 3 percent. Included in places are soils similar to the Tensas soil except that the underlying material is sandy clay loam or clay loam. The included soils make up about 20 percent of the map unit.

Water and air move through this Tensas soil very slowly. Water runs off the surface at a medium rate. This soil has medium fertility. Adequate water is available to plants in most years. A seasonal high water table fluctuates between a depth of about 1 foot and 3 feet during December through April of most years. This soil has very high shrink-swell potential. It is subject to prolonged periods of flooding. Flooding occurs less than 2 times in 5 years during the cropping season and more often than 2 years out of 5 on a yearly basis. Flood waters typically are 2 to 3 feet deep, and the depth exceeds 8 feet in places. Flood duration may exceed 60 days.

Most of the acreage of this soil is used for cultivated crops. A small acreage is used as pastureland, woodland, or homesites.

This soil is somewhat poorly suited to cultivated crops. It is limited mainly by wetness, poor tilth, and flooding. Suitable crops are soybeans, grain sorghum, cotton, and rice. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and organic matter content. Crops respond well to lime and fertilizer. Flooding can be controlled by levees, channels, and pumps. In flood years, waters generally recede in time to plant a short-season crop. Reduced yields as a result of late planting are common. In some years, crops are damaged by flooding late in summer.

This soil is somewhat poorly suited to pasture. The main limitations are wetness and the hazard of flooding. The main suitable pasture plant is common bermudagrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

This soil is moderately well suited to woodland. It has moderately high potential for the production of eastern cottonwood, Nuttall oak, and water hickory. The main concerns in producing and harvesting timber are severe equipment use limitations and high seedling mortality because of flooding and wetness. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from

December to May. Only trees that can tolerate seasonal wetness should be planted.

This soil is poorly suited to recreational and urban development. It is not suited to homesites. The main limitations are wetness, very slow permeability, very high shrink-swell potential, and the hazard of flooding. Major flood control structures and local drainage systems are needed.

This Tensas soil is in capability subclass IVw and in woodland group 3w.

Tn—Tensas-Alligator complex, undulating. These somewhat poorly drained and poorly drained soils are on low parallel ridges and swales within the alluvial plain of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. The somewhat poorly drained Tensas soil is on low convex ridges that are 100 to 250 feet wide. The poorly drained Alligator soil is in concave swales that are 50 to 200 feet wide. Both soils are subject to rare flooding. Slopes are short and choppy and range from 0 to 5 percent.

The mapped areas range from 200 to several hundred acres and are about 56 percent Tensas soil and 29 percent Alligator soil. These soils were so intricately intermingled that it was not practical to map them separately at the scale used.

Typically, the Tensas soil has a surface layer of dark grayish brown, strongly acid silty clay about 5 inches thick. The subsoil is dark grayish brown, mottled, very strongly acid silty clay in the upper part; grayish brown, mottled, very strongly acid silty clay in the middle part; and grayish brown, mottled, strongly acid silty clay loam in the lower part. The underlying material to a depth of about 60 inches is brown, mottled, strongly acid silt loam. In places, the surface layer is clay or silty clay loam.

Water and air move through this soil very slowly. This soil has medium fertility. Adequate water is available to plants in most years. Water runs off the surface at a medium rate. A seasonal high water table is about 1 foot to 3 feet below the surface during December through April of most years. This soil is subject to rare flooding after unusually severe rainstorms. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. This soil has very high shrink-swell potential.

Typically, the Alligator soil has a surface layer of dark grayish brown, strongly acid clay about 5 inches thick. The subsoil is gray, mottled clay. It is very strongly acid in the upper part, strongly acid in the middle part, and slightly acid in the lower part. The underlying material to a depth of about 60 inches is gray, mottled, neutral clay.

Water and air move through this soil very slowly. Adequate water is available to plants in most years. A seasonal high water table fluctuates between about 1/2 foot and 2 feet below the surface during January through April of most years. This soil is subject to rare flooding after unusually severe rainstorms. Flooding occurs less often than 1 year out of 10 during the cropping season and less often than 2 years out of 5 on a yearly basis. The surface layer of this soil remains wet for long periods after heavy rains. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. This soil has very high shrink-swell potential. It has medium fertility.

Included with these soils in mapping are a few small areas of Dundee and Fausse soils. Dundee soils are on the highest ridges and are loamy throughout. Fausse soils are in the deepest swales and do not dry enough to crack from the surface to as deep as 20 inches. Also included are small areas of Tensas soils that have slopes of more than 5 percent. Also included are a few small to large areas that are adequately protected from flooding by levees. The included soils make up about 15 percent of the map unit.

Most of the acreage of these soils is used for cultivated crops. A small acreage is used as pastureland, woodland, or homesites.

The soils in this map unit are moderately well suited to cultivated crops. They are limited mainly by wetness, poor tilth, and short, irregular slopes. Erosion is a hazard on the more sloping Tensas soil. The main suitable crops are soybeans and grain sorghum. A drainage system is needed for most cultivated crops. These soils are difficult to keep in good tilth. They can be worked only within a narrow range of moisture content. Land grading and smoothing improve surface drainage, but in places large volumes of soil need to be moved. Irregular slopes hinder tillage operations. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Most crops respond well to lime and fertilizer.

This complex is moderately well suited to pasture. The main limitation is wetness. Water ponds for long periods in the swales. The main suitable pasture plants are improved bermudagrass, tall fescue, dallisgrass, ryegrass, and common bermudagrass. Excessive water on the surface can be removed by shallow ditches. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This complex is well suited to woodland. It has high potential for the production of eastern cottonwood, American sycamore, sweetgum, and water oak. The main concerns in producing and harvesting timber are severe equipment use limitations and moderately high seedling mortality. Only trees that can tolerate seasonal wetness should be planted. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

The soils in this map unit are poorly suited to homesites and recreational and urban development. The

main limitations are wetness, very high shrink-swell potential, very slow permeability, low strength for roads, and the hazard of flooding. Because of wetness and very slow permeability, septic tank absorption fields do not function properly during rainy periods. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with material that has low shrink-swell potential. Roads need to be designed to offset the limited ability of the soil to support a load. Homes can be built on mounds of properly designed soil material above flood elevations; however, access may be restricted during periods of high water.

The soils in this complex are in capability subclass IIIw and in woodland group 2w.

Ts—Tensas-Alligator complex, undulating, occasionally flooded. These somewhat poorly drained and poorly drained soils are on low parallel ridges and swales within the alluvial plains of the Black and Tensas Rivers and other former channels and distributaries of the Mississippi River. The somewhat poorly drained Tensas soil is on low convex ridges that are 100 to 250 feet wide. The poorly drained Alligator soil is in concave swales 50 to 200 feet wide. Slopes are short and choppy and range from 0 to 5 percent.

The mapped areas range from 100 to several hundred acres and are about 56 percent Tensas soil and 29 percent Alligator soil. These soils are so intricately intermingled that it was not practical to map them separately at the scale used.

Typically, the Tensas soil has a surface layer of dark grayish brown, medium acid silty clay about 6 inches thick. The subsoil is grayish brown, mottled, strongly acid clay in the upper part and grayish brown, mottled, strongly acid silt loam in the lower part. The underlying material to a depth of about 60 inches is grayish brown, mottled, medium acid silty clay loam.

The Tensas soil has medium fertility. Water and air move through this soil very slowly. Water runs off the surface at a medium rate. Adequate water is available to plants in most years. A seasonal high water table is about 1 foot to 3 feet below the surface during December through April of most years. This soil has very high shrink-swell potential. It is subject to brief to very long periods of flooding. Flooding occurs less often than 2 times in 5 years during the cropping season and more often than 2 years out of 5 on a yearly basis. Flood waters typically are 1 foot to 5 feet deep, and the depth exceeds 10 feet in places.

Typically, the Alligator soil has a surface layer of dark grayish brown, medium acid clay about 4 inches thick. The subsoil is light brownish gray, mottled, very strongly acid clay in the upper part and gray, mottled, medium acid clay in the lower part. The underlying material to a depth of about 60 inches is gray, mottled, neutral clay.

The Alligator soil has medium fertility. Water and air move through this soil very slowly. Water runs off the surface very slowly and ponds in low places for long periods after heavy rains. The surface layer of this soil remains wet for long periods after heavy rains. A seasonal high water table fluctuates between about 1/2 foot and 2 feet below the surface during January to April. This soil has very high shrink-swell potential. It is subject to brief to very long periods of flooding. Flooding occurs less often than 2 times in 5 years during the cropping season and more often than 2 years out of 5 on a yearly basis. The depth of flood waters typically ranges from 2 to 6 feet, and it can exceed 10 feet in places.

Included with these soils in mapping are a few small areas of Dundee and Fausse soils. Dundee soils are on the highest ridges and are loamy throughout. Fausse soils are in the deepest swales and do not dry enough to crack as deeply as 20 inches below the surface in most years. Also included are small areas of Tensas soils that have slopes of more than 5 percent. Included in places are Alligator soils that have a thin, reddish surface layer. The included soils make up about 15 percent of the map unit.

Most of the acreage of these soils is used for cultivated crops. A small acreage is in pasture or woodland.

The soils in this map unit are somewhat poorly suited to cultivated crops. They are limited mainly by wetness, poor tilth, flooding, and short, irregular slopes. Soybeans, wheat, and grain sorghum are the main crops. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Irregular slopes hinder tillage operations. Protection from flooding and drainage are needed for most cultivated crops and pasture plants. Land grading and smoothing improve surface drainage, but in places large volumes of soil need to be moved. Maintaining crop residue on or near the surface reduces runoff, improves tilth, and helps to maintain organic matter content. Most crops respond well to lime and fertilizer.

The soils in this map unit are somewhat poorly suited to pasture. The main limitations are wetness and the hazard of flooding. Suitable pasture plants are common bermudagrass, southern winter peas, and vetch. Excessive water on the surface can be removed by shallow ditches. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. During flood periods, cattle need to be moved to adjacent protected areas or to pastures at higher elevations.

The soils in this map unit are moderately well suited to woodland. Alligator soil has very high potential for the production of water oak, eastern cottonwood, green ash, and sweetgum. Tensas soil has moderately high potential. The main concerns in producing and harvesting timber are severe equipment use limitations and high seedling mortality because of wetness, flooding, and the clayey surface layer. Because the clayey soil is sticky when wet, most planting and

harvesting equipment can be used only during dry periods.

The soils in this map unit are poorly suited to urban and recreational development. They are not suited to homesites. The main limitations are low strength for roads, very slow permeability, very high shrink-swell potential, and the hazard of flooding. Major flood control structures and local drainage systems are needed.

The Tensas and Alligator soils are in capability subclass IVw. Tensas soil is in woodland group 3w, and Alligator soil is in 2w.

UD—Udifluvents, loamy. This well drained soil is in an area of spoil or fill material on the flood plain of the Red River. It consists of variable, loamy material that was dredged and then pumped into leveed areas during the construction of the Red River Lock and Dam. This soil is protected from flooding by manmade levees. Slope is dominantly less than 1 percent, but it ranges to 3 percent.

Typically, the surface layer is reddish brown, neutral to moderately alkaline silt loam, very fine sandy loam, or silty clay loam about 6 inches thick. The underlying material to a depth of about 80 inches is reddish brown, neutral, stratified silt loam and silty clay loam. In places, the underlying material contains thin layers of clay and silty clay.

Included with this soil in mapping are many small areas of Sostien soils. Also included are small areas of Udifluvents that have slope of more than 3 percent. The included soils make up about 10 percent of the map unit.

Water and air move through the soil in this map unit at a moderate rate. Water runs off the surface slowly. This soil dries quickly after rains. It has high fertility.

The soil in this map unit is idle land that has been designated for future use as a recreational area or as a storage area for more spoil material that is dredged from surrounding areas during construction activities.

This soil is well suited to recreational development. It has few limitations for this use. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

This soil is well suited to urban development. The main limitations are low strength for roads and moderate permeability for septic tank absorption fields. Roads need to be designed to offset the limited ability of the soil to support a load. The effects of moderate permeability can be partly overcome by increasing the size of the absorption field. Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion.

Udifluvents, loamy, is not in a capability subclass or woodland group.

Prime Farmland

In this section, prime farmland is defined and discussed. The prime farmland soils in Catahoula Parish are listed in table 6.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent.

About 199,661 acres, or nearly 42 percent, of Catahoula Parish meets the soil requirements for prime farmland. This prime farmland is scattered throughout the parish. Most of the acreage is in crops. These crops, mainly soybeans, cotton, rice, and grain sorghum, account for an estimated 75 percent of the parish's total agricultural income each year.

Because Catahoula Parish is primarily rural and does not have a large population center, it has not lost much of its prime farmland to industrial or urban use. In recent years, spurred on by the increasing demand for soybeans, many acres of land only marginally suited to cultivation have been cleared or converted from pasture and placed in cultivation. These marginal lands generally are more erodible and difficult to cultivate, or they flood more frequently than lands designated as prime farmland.

The location of each soil map unit listed in table 6 is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 5. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Soils that have limitations, such as a seasonal high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. However, only those soils that have few limitations and need no additional improvements to qualify for prime farmland are included.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

John W. Powell, conservation agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

More than 300,710 acres in Catahoula Parish was used for crops and pasture in 1983. Of this total, about 245,000 acres was used for crops, mainly soybeans, cotton, and rice. About 50,000 acres was used for pasture. The acreage used for crops has steadily increased in the past 20 years as woodland and pastureland have been converted to cropland.

Differences in crop suitability and management needs result from differences in soil characteristics, such as fertility levels, erodibility, organic matter content, availability of water for plants, drainage, and the hazard of flooding. Cropping systems and soil tillage are also an important part of management. Each farm has a unique soil pattern; therefore, each has unique management problems. Some principles of farm management, however, apply only to specific soils and certain crops. This section presents the general principles of management that can be applied widely to the soils of Catahoula Parish.

Pasture and hayland. Perennial grasses or legumes, or mixtures of these, are grown for pasture and hay (fig. 8). The mixtures generally consist of either a summer or a winter perennial grass and a suitable legume. In addition, many farmers seed small grain or ryegrass in the fall for winter and spring forage. Excess grass in summer is harvested as hay for the winter.

Common and improved bermudagrass and Pensacola bahiagrass are the summer perennials most commonly grown. Improved bermudagrass and Pensacola bahiagrass produce good quality forage. Tall fescue, the chief winter perennial grass, grows well only on soils that have a favorable moisture content. All of these grasses respond well to fertilizers, particularly nitrogen.

White clover, crimson clover, vetch, and wild winter peas are the most commonly grown legumes. They respond well to lime, particularly where grown on acid soils.

Proper grazing is essential for high quality forage, stand survival, and erosion control. Brush and weed

Figure 8.—Pensacola bahiagrass cut for hay in an area of Memphis silt loam, 0 to 2 percent slopes.

control, fertilizer, lime, and renovation of the pasture are also important.

Some farmers obtain additional forage by grazing the understory native plants in woodland. Forage volume varies with the woodland site, the condition of the native forage, and the density of the timber stand. Although most woodland is managed mainly for timber, substantial volumes of forage can be obtained from these areas if properly managed. Stocking rates and grazing periods need to be carefully managed for optimum forage production and to maintain an adequate cover of understory plants to control erosion. Additional information on the production of forage in woodland is in the section, "Woodland Management and Productivity."

Fertilization and liming. The soils of Catahoula Parish range from extremely acid to moderately alkaline to a depth of 20 inches. Most soils used for crops are low in content of organic matter and in available nitrogen. Soils of the alluvial plains, such as the Norwood, Moreland, Sharkey, and Roxana soils, generally need only nitrogen fertilizer for nonleguminous crops. Some of these soils become deficient in potassium after many years of continuous row crops. Some of the soils on alluvial plains, such as Dundee, Hebert, and Tensas soils, need lime and a complete fertilizer for nonleguminous crops. Soils on uplands generally need lime and a complete fertilizer for crops and pasture plants. The amount of fertilizer needed depends on the kind of crop to be grown, on past cropping history, on the level of yield desired, and on the kind of soil. It should be determined on the basis of soil test results. Information and instructions on collecting and testing soil samples can be obtained from the Cooperative Extension Service.

Organic matter content. Organic matter is important as a source of nitrogen for crops. It also increases the rate of water intake, reduces surface crusting, and improves tilth. Most soils of the parish used for crops, especially those that have a silt loam or very fine sandy loam surface layer, are low in organic matter content. The level of organic matter can be maintained by growing crops that produce an extensive root system and an abundance of foliage, by leaving plant residue on the surface, by growing perennial grasses and legumes in rotation with other crops, and by adding barnyard manure.

Soil tillage. Soils should be tilled only enough to prepare a seedbed and to control weeds. Excessive tillage destroys soil structure. Minimum tillage and no-till practices help to maintain soil tilth (fig. 9). The clayey soils in the parish become cloddy if cultivated when too wet or too dry. A compacted layer, generally known as a traffic pan or plowpan, sometimes develops just below the plow layer in loamy soils. It can be avoided by not plowing when the soil is wet or by varying the depth of plowing, or it can be broken up by subsoiling or chiseling. The use of tillage implements that stir the surface and leave crop residue in place protects the soil from beating rains. This helps control erosion, reduces runoff and surface crusting, and increases infiltration.

Drainage. Many of the soils in the parish need surface drainage to make them more suitable for crops. Early drainage methods involved a complex pattern of main ditches, laterals, and surface field ditches. The more recent approach to drainage in this parish is a combination of land smoothing with a minimum of surface drainage ditches. This approach creates larger and more uniformly shaped fields, which are more suited to the use of modern, multirow farm machinery.

Control of erosion. Erosion is a major hazard on many soils in Catahoula Parish. It is an especially serious problem on soils on stream terraces and uplands. Erosion generally is not a serious hazard on soils on the alluvial plains because the topography is mainly level to gently undulating and slopes are short. Sloping soils, such as Memphis and Smithdale soils, are highly susceptible to erosion if left without plant cover for extended periods. If the surface layer of the soil is lost through erosion, most of the available plant nutrients and organic matter are also lost. Soils that have a fragipan, such as Loring and Providence soils, especially need protection against erosion. Soil erosion also results in sedimentation of drainage systems and pollution of streams by sediment, nutrients, and pesticides.

Cropping systems that maintain a plant cover on the soil for extended periods reduce soil erosion. Legume or grass cover crops reduce erosion, increase the content of organic matter and nitrogen in the soils, and improve tilth. Conservation tillage, contour farming, cropping systems that rotate grass or close-growing crops with row crops, and terraces, diversions, and grassed waterways help to control erosion on cropland and pasture. Water control structures in drainageways that drop water to different levels can prevent gullying.

Cropping system. A good cropping system includes a legume for nitrogen, a cultivated crop to aid in weed control, a deep-rooted crop to utilize subsoil fertility and maintain subsoil permeability, and a close-growing crop to help maintain organic matter content. The sequence of crops should keep the soil covered as much of the year as possible.

A suitable cropping system varies with the needs of the farmer and the characteristics of the soil. Producers of livestock, for example, generally use cropping systems that have higher percentages of pasture than the cropping systems of cash-crop farms.

Additional information on erosion control, cropping systems, and drainage practices can be obtained from the local office of the Soil Conservation Service, the Cooperative Extension Service, or the Louisiana Agricultural Experiment Station.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 7. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby parishes and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 7 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the

Figure 9.—No-till soybeans planted in wheat stubble in an area of Alligator clay, occasionally flooded.

Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only

class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c.*

Woodland Management and Productivity

Carl V. Thompson, Jr., state staff forester, Soil Conservation Service, helped prepare this section.

This section provides information on the relation between trees and their environment, particularly trees and the soils in which they grow. It includes information on the kind, amount, and condition of woodland resources in Catahoula Parish and soils interpretations that can be used in planning.

Soil directly influences the growth, management, harvesting, and multiple uses of forests. It is the medium in which a tree is anchored and from which it draws its nutrients and moisture. Soil characteristics, such as chemical composition, texture, structure, depth, and slope position, affect tree growth, seedling survival, species adaptability, and equipment limitations.

The ability of a soil to supply moisture and nutrients to trees is strongly related to its texture, structure, and depth. Generally, sandy soils, such as Alaga soils, are less fertile and lower in water holding capacity than clayey soils, such as Bayoudan soils. However, aeration is often impeded in clayey soils, particularly under wet conditions. Slope position strongly influences species composition as well as growth within an individual tree.

These soil characteristics, in combination, largely determine the forest stand species composition and influence management and use decisions. Sweetgum, for example, is tolerant of many soils and sites, but grows best on the rich, moist, alluvial loamy soils of bottom lands. Use of heavy logging and site preparation equipment is more restricted on clayey soils than on better drained, sandy or loamy soils.

Woodland Resources

Catahoula Parish is a study in contrasting forest cultures. The predominating pine forest of the rolling uplands is strikingly different from the hardwoods of the bottom lands. Although most of the bottom land hardwoods have been cleared to make way for agricultural crops, the bottom lands once supported vast forests of oak, gum, cypress, hickory, pecan, ash, elm, and cottonwood. Only remnants of the bottom land forest are left in Catahoula Parish. They generally consist of scattered, low tracts, swamps, and borders along lakes, bayous, and streams. Conversely, the uplands are almost totally wooded. Only a few scattered areas are devoted to crops, pastures, small villages, or homesteads. The uplands of Catahoula Parish are primarily in pine, although some of the bottoms of small streams that drain the uplands produce limited quantities of hardwood.

Catahoula parish contains about 140,000 acres of commercial woodland *(13)*. Commercial woodland is defined as that producing or capable of producing crops of industrial wood and not withdrawn from timber use. About 41 percent of the commercial forests is owned by forest industry; 11 percent by private farms, 42 percent by miscellaneous private, and 6 percent is public forest land. About 12,000 acres of the Saline Wildlife Management Area, a bottom land hardwood tract interlaced with numerous bayous and sloughs, is located in the southwest part of the parish.

The land in the parish is divided into three major land resource areas (MLRA): Southern Mississippi Valley Alluvium, Western Coastal Plain, and Southern

Mississippi Valley Silty Uplands. Dominant trees in the Western Coastal Plain MLRA are loblolly and shortleaf pine and associated sweetgum, red oaks, and white oaks. Southern Mississippi Valley Alluvium MLRA has ash, cottonwood, elm, and sycamore on well drained soils, and ash, elm, oak, gum, cypress, pecan, and hackberry on poorly drained soils. Southern Mississippi Valley Silty Uplands MLRA has red oaks, loblolly pine, sweetgum, and sycamore.

Commercial forests may be further divided into forest types *(13)*. Types may be based on tree species, site quality, or age. As used in this survey, forest types are stands of trees of similar character, composed of the same species, and growing under the same ecological and biological conditions. The forest types are named for the dominant trees.

The *oak-gum-cypress* forest type comprises 57 percent of the forest land in Catahoula Parish. This type is composed of bottom land forests of tupelo, blackgum, sweetgum, oak, and baldcypress, singularly or in combination. Associated trees include cottonwood, black willow, ash, hackberry, maple, and elm.

The *elm-ash-cottonwood* forest types comprises less than 1 percent of the forest land in the parish. American elm, green ash, and eastern cottonwood constitute a plurality of the stocking. Major associates include water hickory, sweetgum, boxelder, black and sandbar willows, and Nuttall, willow, water, and overcup oaks.

The *loblolly-shortleaf pine* forest type comprises 7 percent of the forest land in Catahoula Parish. Loblolly pine is generally dominant except on drier sites (fig. 10). Scattered hardwoods, such as sweetgum, blackgum, southern red oak, post oak, white oak, mockernut hickory, and pignut hickory may be mixed with pines on well drained soils. On the more moist sites, sweetgum, red maple, water oak, and willow oak may be mixed with the pines. American beech and ash are associated with this forest type on fertile, well drained coves and along stream bottoms.

The *oak-pine* forest type comprises about 21 percent of the parish's forest land. About 50 to 75 percent of the stocking is hardwoods, generally upland oaks and 25 to 50 percent is softwoods that do not include cypress. The species that compromise the oak-pine type are primarily the result of soil, slope, and aspect. On the higher, drier sites the hardwood components tend to be upland oaks, such as post, southern red, and blackjack oaks. On the more moist and more fertile sites, they are white, southern red, and black oaks. Blackgum, winged elm, red maple, and various hickories are associated with the oak-pine type on both of these broad site classifications.

The *oak-hickory* forest type comprises 14 percent of the forest land in the parish. Upland oaks or hickory, singly or in combination, comprise a plurality of the stocking. Common associates include elm and maple.

The forest land in Catahoula Parish, by physiographic class, is 38 percent pine, 3 percent upland hardwood, and 59 percent bottom land hardwood.

The marketable timber volume is composed of about 31 percent pine and 69 percent hardwood. About 45 percent of the forest acreage is in sawtimber, 31 percent is saplings and seedlings, and 24 percent is pole timber. Most of the more productive sites are in pasture or cropland. Consequently, none of the forest land produces 120 cubic feet or more of wood per acre. Only 10 percent produces 85 to 120 cubic feet per acre, and 90 percent produces less than 85 cubic feet per acre *(13)*.

The importance of timber production to the economy of the parish is significant. Most of the upland pine sites are owned by forest industries. These forests are generally well managed. However, the small, privately-owned tracts, and most of the bottom land tracts, are producing well below potential. Most of these tracts would benefit if stands were improved by thinning out mature trees and undesirable species. Protection from grazing, fire, insects and diseases and tree planting and timber stand improvement are also needed to improve stands.

The Soil Conservation Service, Louisiana Office of Forestry, or Louisiana Cooperative Extension Service can help determine specific woodland management needs.

Environmental Impact

Other values associated with woodlands include wildlife habitat, recreation, natural beauty, and conservation of soil and water. The commercial forest land of Catahoula Parish provides food and shelter for wildlife and offers opportunity for sport and recreation to many users annually. Hunting and fishing clubs in the parish lease or otherwise use the forest land. Forest land provides watershed protection, helps to arrest soil erosion and reduce sedimentation, and enhances the quality and value of water resources.

Trees can be planted to screen distracting views of dumps and other unsightly areas, muffle the sound of traffic, reduce the velocity of winds, and lend beauty to the landscape. They produce fruits and nuts for use by people as well as wildlife. Trees and forests help filter out airborne dust and other impurities, convert carbon dioxide into life-giving oxygen, and provide shade from the sun's hot rays.

Production of Forage in Woodland

The kind and amount of understory vegetation that can be produced in an area is related to the soils, climate, and amount of tree overstory. In many pine woodlands, cattle grazing can be a compatible secondary use. Grazing is not recommended on hardwood woodland. Grasses, legumes, forbs, and many

Figure 10.—Young stand of loblolly pine in an area of Smithdale-Lucy-Providence association, 5 to 25 percent slopes.

woody browse species in the understory are grazable if properly managed to supplement a woodland enterprise without damage to the wood crop. In fact, on most pine woodland, grazing is beneficial to the woodland program because it reduces the accumulation of heavy "rough," thus reducing the hazard of wildfires, and it helps to suppress undesirable woody plants.

The success of a combined woodland and livestock program depends primarily on the degree and time of grazing of the forage plants. Intensity of grazing should maintain adequate cover for soil protection and maintain or improve the quantity and quality of trees and forage vegetation.

Forage production varies according to the type of woodland and the amount of sunlight that reaches the understory vegetation during the growing season. Soils that have about the same potential to produce trees also have similar potential for producing about the same kind and amount of understory vegetation. The vegetative community on these soils will reproduce itself as long as the environment does not change.

Research has proven there is a close correlation between the total potential yield of grasses, legumes, and forbs in similar soils and the amount of sunlight reaching the ground at midday in the forest. Herbage production continues to decline as the forest canopy becomes denser.

One of the main objectives in good woodland grazing management is to keep the woodland forage in excellent or good condition. If this is done, water is conserved, yields are improved, and the soils are protected.

Woodland Production

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops.

Only those soils suitable for wood crops are listed. The table lists the ordination symbol (woodland suitability) for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in a well-managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

Catahoula Parish has many areas of scenic and historic interest that are used for camping, hunting, fishing, sightseeing, picknicking, and boating. Public areas available for recreation include Saline and Sicily Island Wildlife Management Areas, Fort Hill, Dogwood Trail, and Rock Canyon. A recreation area will also be available upon completion of the Red River Lock and Dam Number 1.

In table 9, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Billy R. Craft, state staff biologist, Soil Conservation Service, helped prepare this section.

Catahoula Parish has a large and varied population of fish and wildlife. Habitat includes open agricultural land, upland pine forests, and bottom land hardwood forests, each supporting populations of game and nongame wildlife.

Areas of cropland and pasture provide food and cover for mourning dove, bobwhite quail, snipe, woodcock, killdeer, cottontail and swamp rabbits, red fox, coyote, and many types of songbirds and nongame animals. Temporarily flooded fields provide food and resting areas for large concentrations of migrating waterfowl. The main limitation for small game is a shortage of adequate fall and winter cover.

The bottom land hardwood forest in Catahoula Parish represents some of the best habitat for woodland wildlife in the state. This resource continues to be seriously depleted as land is cleared and converted to cropland. Large numbers of white-tailed deer, gray and fox squirrel, swamp rabbit, raccoon, bobcat, coyote, wild turkey, and many types of birds, reptiles, and amphibians inhabit the hardwood forest. The upland pine forests in the northwestern part of the parish provide good habitat for bobwhite quail, cottontail rabbit, and white-tailed deer. Most of the forested land in the parish is leased by private hunting clubs.

The many ponds, lakes, bayous, and rivers of the parish support large populations of game fish, such as largemouth bass, white bass, white and black crappie, and sunfish. Commercial catfish, buffalo, bowfin, and shad are caught in large numbers each year. Shallow lakes and wetland areas provide habitat for crawfish, a very important food for many species of wildlife and for man. In addition, many private ponds have been constructed in the parish for crawfish production.

Many areas in the parish can be improved for wildlife by increasing the supply of suitable food, water, and cover. Soils that are best suited to use as habitat for wildlife are in map units 1, 2, 3, 4, 12, 13, and 14 described in the section "General soil map units." Federally funded cost-sharing programs provide incentives to private landowners to retain and improve wetlands and other areas for use as habitat for wildlife. In addition, two large state-owned hunting and fishing areas, Red River and Saline, are within the parish and are intensively managed for wildlife habitat and outdoor recreation.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, soybeans, grain sorghum, wheat, and rice.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bermudagrass, bahiagrass, clover, and vetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, paspalum, wooly croton, and uniola.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, sugarberry, water hickory, persimmon, sweetgum, hawthorn, dogwood, hickory, blackberry, greenbrier, muskadine, and huckleberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are tree huckleberry, redbay, and mayhaw.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, cedar, and baldcypress.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are American beautyberry, waxmyrtle, American elder, sumac, and elderberry.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, mourning dove, meadowlark, field sparrow, cottontail, red fox, and coyote.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and coyote.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, nutria, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this

section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts and sodium affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the

indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of

sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction (fig. 11). Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to

Figure 11.—Sand and gravel are being removed from this area of Memphis-Smithdale association, 5 to 40 percent slopes.

overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts or sodium. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depreciation is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions and that it occurs less often than 1 year out of 10. *Occasional* means that flooding occurs, on the average, no more than twice in 5 years during the cropping season. *Frequent* means that flooding occurs, on the average, more than twice in 5 years during the cropping season. The cropping season in this survey area is considered to be the period from June 1 to November 30. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian*, or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or

weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(15)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqualf (*Aqu*, meaning water, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Ochraqualfs (*Ochr*, meaning pale or light colored, plus *aqualf*, the suborder of the Alfisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aeric* identifies the subgroup that typifies the great group. An example is Aeric Ochraqualfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, thermic Aeric Ochraqualfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (14)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (15)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alaga Series

The Alaga series consists of somewhat excessively drained, rapidly permeable soils that formed in sandy marine or alluvial sediment of Tertiary age. These soils are on ridgetops and side slopes on uplands. Slopes range from 2 to 25 percent. Soils of the Alaga series are thermic, coated Typic Quartzipsamments.

Alaga soils commonly are near Guyton, Lucy, Oula, Providence, and Smithdale soils. Guyton soils are in drainageways, are gray throughout, and have a fine-silty control section. Lucy, Oula, and Smithdale soils are in positions similar to those of Alaga soils. Lucy soils have

a reddish, loamy subsoil within 20 to 40 inches below the surface. Oula soils have a clay subsoil, and Smithdale soils are loamy throughout. Providence soils are on ridgetops, and they are fine-silty and have a fragipan.

Typical pedon of Alaga loamy sand, in an area of Alaga-Smithdale-Lucy association, 5 to 40 percent slopes; about 8 miles northwest of Harrisonburg, 2 miles left on first gravel road past Catahoula Church, 0.1 mile left on logging road, 225 paces at 340 degrees north in NW1/4NW1/4 sec. 7, T. 9 N., R. 6 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) loamy sand; single grained; loose; common fine roots; medium acid; abrupt smooth boundary.

C1—4 to 10 inches; light yellowish brown (10YR 6/4) loamy sand; single grained; loose; common fine and medium roots; strongly acid; clear smooth boundary.

C2—10 to 24 inches; brown (10YR 5/3) loamy sand; single grained; loose; common fine and medium roots and few large roots; very strongly acid; clear smooth boundary.

C3—24 to 51 inches; yellowish brown (10YR 5/4) loamy sand; single grained; loose; few medium and coarse roots; very strongly acid; clear smooth boundary.

C4—51 to 92 inches; light yellowish brown (10YR 6/4) loamy sand; single grained; loose; very strongly acid.

Thickness of sandy horizons is more than 80 inches. Reaction ranges from very strongly acid to medium acid throughout.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2. It ranges from 4 to 8 inches thick.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 3, 4, or 6; or hue of 2.5Y, value of 5 or 6, and chroma of 6. It is loamy sand or loamy fine sand.

Alligator Series

The Alligator series consists of poorly drained, very slowly permeable soils that formed in clayey alluvium deposited by the Mississippi River and possibly the Arkansas and Ouachita Rivers. These soils are on broad flats and in depressional areas. Slopes range from 0 to 3 percent. Soils of the Alligator series are very-fine, montmorillonitic, acid, thermic Vertic Haplaquepts.

Alligator soils commonly are near Dundee, Fausse, Forestdale, Perry, and Tensas soils, and they are similar to Sharkey soils. Dundee and Tensas soils are in higher positions than Alligator soils. Dundee soils are loamy throughout, and Tensas soils have a subsoil that is loamy in the lower part. Fausse soils are in lower positions than Alligator soils and do not crack as deeply as the Alligator soils during dry periods. Forestdale, Perry, and Sharkey soils are in slightly higher positions than Alligator soils. Forestdale soils have a fine-textured argillic horizon, and Perry and Sharkey soils have a nonacid control section.

Typical pedon of Alligator clay, occasionally flooded; about 4 miles east of Harrisonburg, 2 miles south of Guthrie Lake, 24 feet north of a field road that follows highline, 24 feet east of the field road that connects with the highline road; NW1/4NW1/4 sec. 21, T. 9 N., R. 7 E.

Ap—0 to 4 inches; dark gray (10YR 4/1) clay; moderate medium subangular blocky structure; firm, plastic; common fine roots; strongly acid; abrupt smooth boundary.

Bg1—4 to 14 inches; gray (10YR 6/1) clay; common fine and medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, plastic; very strongly acid; clear wavy boundary.

Bg2—14 to 28 inches; gray (10YR 6/1) clay; common medium and many fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, plastic; common nonintersecting slickensides; very strongly acid; clear smooth boundary.

Bg3—28 to 49 inches; gray (10YR 6/1) clay; common fine and medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, plastic; common nonintersecting slickensides; strongly acid; clear smooth boundary.

Cg—49 to 60 inches; gray (10YR 6/1) clay; pockets of many fine distinct dark brown (10YR 3/3) mottles, common fine yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; massive; firm, plastic; neutral.

Thickness of the solum ranges from 40 to 60 inches. Reaction in the upper 25 inches of the profile is strongly acid or very strongly acid except where the surface layer has been limed. Reaction below a depth of 25 inches ranges from very strongly acid to neutral. Cracks 1 to 5 centimeters wide develop to a depth of 50 centimeters or more below the surface in most years.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is 4 to 10 inches thick.

The Btg and Cg horizons have hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Mottles in shades of brown or yellow range from few to many.

The Alligator soils in Catahoula Parish are taxadjuncts to the Alligator series because they are less acid between a depth of 25 and 40 inches than is typical for the series. This difference does not affect use and management of the soils.

Bayoudan Series

The Bayoudan series consists of moderately well drained, very slowly permeable soils that formed in clayey marine sediment of Tertiary age. These soils are on ridgetops and side slopes on uplands. Slopes range from 5 to 40 percent. Soils of the Bayoudan series are

very-fine, montmorillonitic, thermic Aquentic Chromuderts.

Bayoudan soils commonly are near Alligator, Providence, Smithdale, and Sweatman soils. Alligator soils are on flood plains of the Ouachita River adjacent to Bayoudan soils and are gray throughout. Providence soils are in higher positions than Bayoudan soils, are fine-silty, and have a fragipan. Smithdale soils are on lower side slopes than Bayoudan soils and are loamy throughout. Sweatman soils are in positions similar to those of the Bayoudan soils, and they have a fine-textured control section and do not have vertic properties.

Typical pedon of Bayoudan clay, 5 to 40 percent slopes; about 5.5 miles west of Enterprise, 2.7 miles west on Highway 124 from Highway 559, 2.5 miles west on a gravel road, 350 feet northwest on a logging road; SE1/4NW1/4 sec. 29, T. 11 N., R. 5 E.

A—0 to 2 inches; dark grayish brown (10YR 4/2) clay; weak medium granular structure; firm, plastic; few fine and medium roots; very strongly acid; abrupt irregular boundary.

Bw1—2 to 7 inches; yellowish red (5YR 5/6) clay; common medium prominent grayish brown (10YR 5/2) mottles and many medium faint reddish brown (5YR 5/4) mottles; moderate medium subangular blocky structure; firm, plastic; few fine and medium roots; few fine pores; many prominent shiny faces on peds; extremely acid; clear wavy boundary.

Bw2—7 to 18 inches; yellowish brown (10YR 5/4) clay; few fine prominent reddish brown (5YR 5/4) mottles and common medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; firm, plastic; few fine and medium roots; many prominent shiny faces on peds; few prominent intersecting slickensides; extremely acid; gradual wavy boundary.

Bw3—18 to 34 inches; pale olive (5Y 6/3) clay; common coarse prominent yellowish brown (10YR 5/8) mottles; weak medium blocky structure; firm, plastic; few fine and medium roots; few prominent intersecting slickensides; common medium and fine crystals of gypsum; extremely acid; gradual wavy boundary.

C1—34 to 41 inches; stratified light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/4) clay; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium blocky structure; firm, plastic; few fine roots; many intersecting slickensides; common medium and fine crystals of gypsum; very strongly acid; abrupt wavy boundary.

C2—41 to 63 inches; stratified light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/8) clay; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium blocky structure; firm, plastic; many intersecting slickensides; common medium crystals of gypsum; mildly alkaline.

Thickness of the solum ranges from 10 to 30 inches. Intersecting slickensides range from few to many. The particle-size control section commonly contains more than 80 percent clay. The effective cation exchange capacity of this soil is 20 to 50 percent saturated with exchangeable aluminum in the control section to a depth of 30 inches or more.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 to 4. Reaction ranges from strongly acid to slightly acid. The A horizon typically is 3 to 5 inches thick, and it is absent in some pedons. The A horizon is clay, silty clay, or silty clay loam.

The upper part of the Bw horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 to 8. The lower part has the same range in colors as the upper part, or it has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 to 4. Mottles in shades of brown, red, or gray range from few to many. Reaction ranges from extremely acid to strongly acid.

The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 2 to 4. Mottles in shades of brown, red, or gray range from none to common. Reaction ranges from extremely acid to moderately alkaline. Crystals of gypsum range from few to many. A few fine accumulations of carbonates are in some pedons.

Bursley Series

The Bursley series consists of poorly drained, moderately slowly permeable soils that formed in a thin mantle of recent alluvium over mixed loess and loamy stream terrace deposits of late Pleistocene age. These soils are on broad, low stream terraces. Unprotected areas of these soils are subject to rare flooding. Slopes range from 0 to 2 percent. Soils of the Bursley series are fine-silty, mixed, thermic Aeric Glossaqualfs.

Bursley soils commonly are near Forestdale and Necessity soils. They are similar to Calloway soils. Calloway and Necessity soils are in higher positions than Bursley soils and have a fragipan. Forestdale soils are in drainageways and have a fine-textured subsoil.

Typical pedon of Bursley silty clay loam, rarely flooded; about 8.0 miles south of Harrisonburg, 0.6 mile west of Good Road Pentecostal Church, 75 feet north of a gravel road; SE1/4NW1/4 sec. 28, T. 8 N., R. 6 E.

Ap—0 to 4 inches; dark brown (10YR 3/3) silty clay loam; weak medium granular structure; friable; common fine roots; neutral; clear smooth boundary.

Bw—4 to 18 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few thin discontinuous clay

films on faces of peds; few fine roots; strongly acid; clear smooth boundary.

2B/E—18 to 32 inches; yellowish brown (10YR 5/4) silty clay loam (B); common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; common thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium brown and black concretions; about 20 percent by volume ped coatings and tongues of grayish brown (10YR 5/2) silt loam (E); very strongly acid; clear wavy boundary.

2Btb—32 to 46 inches; mottled yellowish brown (10YR 5/4) and grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; common thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; few fine and medium black concretions; few thin grayish brown (10YR 5/2) silt coatings on faces of peds; strongly acid; clear smooth boundary.

3Btb—46 to 61 inches; brown (7.5YR 4/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few thin discontinuous clay films on faces of peds; common and fine medium black concretions; few fine pores; strongly acid; clear smooth boundary.

3C—61 to 72 inches; brown (7.5YR 4/4) loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; massive; very friable; strongly acid.

Thickness of the solum ranges from 60 to 100 inches. Depth to the 2B horizon ranges from 12 to 20 inches. Depth to the 3B horizon ranges from 30 to 60 inches.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam or silty clay loam and ranges in thickness from 4 to 8 inches. Mottles, if present, are in shades of brown. Reaction, except in the surface layer of those soils that have been limed, ranges from very strongly acid to medium acid.

The Bw horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. It is silt loam or silty clay loam. Mottles are in shades of brown. Reaction ranges from very strongly acid to medium acid.

The B part of the 2B/E horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. The E part has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. The B material is silty clay loam or silt loam, and the E material is silt loam. Mottles are in shades of gray, yellow, or brown. Most peds are coated or partly coated with grayish brown clay films. Black or brown concretions range from few to common. Reaction ranges from very strongly acid to medium acid.

The 2Btb horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. It is silty clay loam or silt loam. Mottles are in shades of gray, yellow, or brown. Concretions range from few to common. Reaction ranges from very strongly acid to medium acid.

The 3Btb and 3C horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6. They are loam, very fine sandy loam, or silty clay loam. In some pedons, reddish clay is below a depth of 60 inches. Mottles are in shades of gray, brown, or yellow. Reaction ranges from very strongly acid to neutral.

Calhoun Series

The Calhoun series consists of poorly drained, slowly permeable soils that formed in loess of late Pleistocene age and in mixed loess and silty alluvium. These soils are on broad flats and in narrow drainageways on high and low stream terraces. Some areas of these soils are subject to rare flooding. Slope is less than 1 percent. Soils of the Calhoun series are fine-silty, mixed, thermic Typic Glossaqualfs.

Calhoun soils commonly are near Calloway, Loring, and Memphis soils. They also are similar to Guyton soils. Guyton soils contain more than 10 percent sand in the textural control section. Calloway soils are in higher positions than Calhoun soils and have a fragipan. Loring soils are on higher, convex ridges and have a fragipan. Memphis soils are in higher positions than Calhoun soils and are browner throughout.

Typical pedon of Calhoun silt loam, about 2 miles north of Sicily Island, 42 paces west of a fence, 20 paces north of a field road; SE1/4E1/2 Spanish Land Grant 19, T. 10 N., R. 8 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam; common fine distinct yellowish brown (10YR 5/4) mottles; weak medium granular structure; very friable; few fine roots; strongly acid; clear smooth boundary.

Eg1—5 to 13 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; common fine pores; few fine black concretions; medium acid; clear smooth boundary.

Eg2—13 to 20 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; common fine pores; few fine black concretions; medium acid; abrupt irregular boundary.

Btg1—20 to 49 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6, 5/4) mottles; moderate medium subangular blocky structure; firm; common fine pores; common thin discontinuous clay films on faces of peds; common fine and medium black concretions; few tongues of grayish brown (10YR

5/2) silt loam 1/2 inch to 1-1/2 inches wide; common thin silt coatings on faces of peds; medium acid; clear wavy boundary.

BCg—49 to 64 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; common fine pores; few thin discontinuous clay films on faces of peds; common fine and medium black concretions; common thin silt coatings on faces of peds; medium acid; clear wavy boundary.

Cg—64 to 80 inches; grayish brown (10YR 5/2) silt loam; many medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; massive; firm; few fine pores; common fine and medium black concretions; medium acid.

Thickness of the solum ranges from 40 to 80 inches. Sand content is less than 10 percent of the solum to a depth of 48 inches.

The A or Ap horizon is 2 to 7 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed.

The Eg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is 10 to 20 inches thick. Mottles are in shades of brown or yellow. Reaction ranges from very strongly acid to medium acid.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is silt loam or silty clay loam. Mottles are in shades of brown and yellow. Reaction ranges from very strongly acid to medium acid.

The BCg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles are in shades of brown or yellow. Reaction ranges from very strongly acid to neutral.

The Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles are in shades of brown or yellow. Reaction ranges from very strongly acid to mildly alkaline.

Calloway Series

The Calloway series consists of somewhat poorly drained, slowly permeable soils that have a fragipan. These soils formed in loess of late Pleistocene age. They are on slightly convex ridges on high and low stream terraces. Some areas of these soils are subject to rare flooding. Slopes range from 0 to 2 percent. Soils of the Calloway series are fine-silty, mixed, thermic Glossaquic Fragiudalfs.

Calloway soils commonly are near Calhoun, Loring, and Memphis soils and are similar to Bursley soils. Calhoun soils are in lower positions than Calloway soils. Loring and Memphis soils are in higher positions than Calloway soils and do not have gray mottles within a depth of 16 inches. Bursley, Calhoun, and Memphis soils do not have a fragipan.

Typical pedon of Calloway silt loam; about 2 miles northwest of Sicily Island, 0.6 mile north of the intersection of Highways 915 and 916, 66 feet east of Highway 916; SW1/4NW1/4 sec. 6, T. 10 N., R. 8 E.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; very friable; many fine roots; few fine black concretions; very strongly acid; clear smooth boundary.

B/E—7 to 17 inches; yellowish brown (10YR 5/4) silt loam (B); about 20 percent by volume light gray (10YR 7/2) silt loam (E); common fine faint dark brown (7.5YR 4/4) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; few fine roots; few fine red and black concretions; very strongly acid; clear wavy boundary.

E'2—17 to 24 inches; light gray (10YR 7/2) silt loam; common fine distinct dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; very friable; few fine roots; few fine black concretions; very strongly acid; clear wavy boundary.

Bx1—24 to 36 inches; brown (10YR 5/3) silty clay loam; common medium faint yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm and brittle; thin discontinuous clay films on vertical faces of peds; common thin coatings of light gray (10YR 7/2) silt loam on faces of prisms; few fine roots; common fine black concretions; very strongly acid; clear smooth boundary.

Bx2—36 to 60 inches; brown (10YR 5/3) silty clay loam; many fine distinct strong brown (7.5YR 5/8) mottles; weak medium prismatic structure; firm and brittle; thin discontinuous clay films on faces of peds; light gray (10YR 7/2) silt coatings on vertical faces of prisms; strongly acid.

Thickness of the solum is 60 inches or more. Depth to the fragipan ranges from 18 to 36 inches. Sand content is less than 10 percent of the solum to a depth of 48 inches. Reaction ranges from very strongly acid to medium acid in the upper part of the solum and strongly acid to slightly acid in the lower part. The effective cation exchange capacity of this soil is 20 to 50 percent saturated with exchangeable aluminum in the control section to a depth of 30 inches or more.

The Ap horizon is 3 to 6 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 2 to 4.

The E horizon, if present, the E' horizon, and the E part of the B/E horizon have hue of 10YR, value of 4 to 7, and chroma of 2 or 3. The B part of the B/E horizon has hue of 10YR, value of 4 to 6, and chroma of 4 to 6. It is silt loam or silty clay loam.

The Bx horizon has hue of 10YR, value of 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

Dundee Series

The Dundee series consists of somewhat poorly drained, moderately slowly permeable soils that formed in loamy alluvium deposited by the Mississippi River. These soils are on natural levees of distributary channels within the alluvial plain. Unprotected areas of these soils are subject to rare flooding. Slopes range from 0 to 3 percent.

Soils of the Dundee series are fine-silty, mixed, thermic Aeric Ochraqualfs.

Dundee soils commonly are near Alligator, Sharkey, and Tensas soils and are similar to Hebert soils. Alligator, Sharkey, and Tensas soils are in lower positions than Dundee soils and have a fine-textured control section. Hebert soils are in positions similar to those of the Dundee soils and also are along stream channels. The Bt horizon of the Hebert soils are reddish.

Typical pedon of Dundee silt loam, 0 to 1 percent slopes; about 5 miles south of Jonesville, 0.95 mile south of St. Paul Church on a gravel road, 50 feet east of the road in a soybean field; SW1/4NE1/4 sec. 33, T. 7 N., R. 6 E.

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; weak medium granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Btg1—4 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; common thin continuous dark gray (10YR 4/1) clay films on faces of peds; few fine roots; few fine pores; medium acid; clear smooth boundary.

Btg2—9 to 26 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; common thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

BC—26 to 49 inches; grayish brown (10YR 5/2) loam; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; very friable; few fine roots; few fine pores; few thin discontinuous clay films on faces of peds; medium acid; clear smooth boundary.

2Cg—49 to 60 inches; grayish brown (10YR 5/2) very fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; very friable; slightly acid.

Thickness of the solum ranges from 30 to 60 inches.

The A or Ap horizon is 4 to 8 inches thick. It has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. Where the value is 3, the thickness of the horizon is less than 6 inches. The A horizon is very fine sandy loam, silt loam, or silty clay loam. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2. It has mottles in shades of brown. The Bt horizon is silt loam or silty clay loam. Reaction ranges from very strongly acid to medium acid.

The BC horizon has the same range in colors as the Bt horizon. It is loam, silt loam, or silty clay loam. Reaction ranges from very strongly acid to medium acid.

The 2Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 2. It is silt loam, very fine sandy loam, or loam. Thin silty clay or clay strata are between a depth of 40 to 60 inches in some pedons. Reaction ranges from very strongly acid to neutral.

Fausse Series

The Fausse series consists of very poorly drained, very slowly permeable soils that formed in alluvium deposited by the Mississippi River. These soils are in the lowest positions on the alluvial plain. They are subject to frequent flooding and have a seasonal high water table that is within 24 inches of the soil surface in most years. Slopes are less than 1 percent. Soils of the Fausse series are very-fine, montmorillonitic, nonacid, thermic Typic Fluvaquents.

Fausse soils commonly are near Alligator and Sharkey soils. Alligator and Sharkey soils are in slightly higher positions than Fausse soils. They have cracks that extend to a depth of more than 20 inches during dry periods of most years.

Typical pedon of Fausse clay; about 18 miles southwest of Jonesville, 0.5 mile north of Dry Larto Island, 55 feet west of Saline Bayou; NW1/4NW1/4 sec. 28., T. 5 N., R. 5 E.

A—0 to 8 inches; reddish brown (5YR 4/4) clay; common medium distinct gray (10YR 5/1) mottles; weak fine subangular blocky structure; plastic and very sticky; many fine roots; medium acid; clear wavy boundary.

Bg1—8 to 21 inches; gray (10YR 5/1) clay; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; plastic and very sticky; few fine roots; slightly acid; clear smooth boundary.

Bg2—21 to 36 inches; gray (N 5/0) clay; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; plastic and very sticky; few fine and medium roots; slightly acid; clear smooth boundary.

Bg3—36 to 47 inches; gray (5Y 5/1) clay; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; plastic and very

sticky; few medium roots; mildly alkaline; clear smooth boundary.

Cg—47 to 60 inches; gray (N 5/0) clay; common medium distinct yellowish brown (10YR 5/6) mottles and few fine distinct light olive brown (2.5Y 5/4) mottles; massive; plastic and very sticky; mildly alkaline.

Thickness of the solum ranges from 25 to 50 inches. Organic surface horizons, if present, are less than 2 inches thick.

The A horizon is 4 to 9 inches thick. It has a hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 3 or 4. Reaction ranges from medium acid to neutral.

The Bg and Cg horizons have hue of 10YR, 5Y, or 5GY, value of 4 or 5, and chroma of 1, or they are neutral. Reaction in the Bg horizon ranges from slightly acid to moderately alkaline. It ranges from neutral to moderately alkaline in the Cg horizon.

The Fausse soils in Catahoula Parish are taxadjuncts to the Fausse series because they have a surface layer that has redder hue than allowed for the series. This difference, however, does not affect the use and management of the soils.

Forestdale Series

The Forestdale series consists of poorly drained, very slowly permeable soils. These soils formed in recent, clayey alluvium deposited by the Mississippi River and possibly the Arkansas and Ouachita Rivers and in the underlying loamy deposits of late Pleistocene age. These soils are on low stream terraces. Slopes are less than 1 percent. Soils of the Forestdale series are fine, montmorillonitic, thermic Typic Ochraqualfs.

Forestdale soils commonly are near Alligator, Bursley, Calhoun, and Necessity soils and are similar to Tensas soils. Alligator soils are in lower positions than Forestdale soils and have a very-fine control section. Bursley, Calhoun, and Necessity soils are in higher positions than Forestdale soils and are loamy throughout. Tensas soils have vertic properties.

Typical pedon of Forestdale silty clay loam, occasionally flooded; about 10 miles southwest of Harrisonburg, 1.2 miles west on a gravel road from Highway 923, 150 feet north of the road, in soybean field; SE1/4SE1/4 sec. 24, T. 8 N., R. 5 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam; weak medium subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

Btg1—7 to 14 inches; gray (10YR 5/1) silty clay; many medium prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; slightly sticky and plastic; common fine and medium roots; thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

Btg2—14 to 30 inches; light gray (10YR 6/1) silty clay; common medium distinct yellowish red (5YR 5/6, 5/8) mottles; weak medium subangular blocky structure; slightly sticky and plastic; few fine roots; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

2Btgb1—30 to 43 inches; gray (10YR 5/1) silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; common discontinuous grayish brown (10YR 5/2) clay films on faces of some peds; few medium black and brown concretions; strongly acid; gradual wavy boundary.

2Btgb2—43 to 62 inches; gray (10YR 5/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; vertical seams of pale brown (10YR 6/3) silty clay loam; firm and brittle prisms 1/2 inch to 2 inches wide; brittle material comprises about 40 percent of horizon; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few medium black and brown concretions; slightly acid.

Thickness of the solum ranges from 40 to 80 inches. Reaction of the A and upper part of the Btg horizons range from very strongly acid to medium acid except where the surface layer has been limed. The lower part of the Btg horizon and the 2Btbg horizon range from very strongly acid to neutral.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2. It is 4 to 10 inches thick.

The Btg horizon has hue of 10YR, value of 4 or 5, and chroma of 1, or it has hue of 10YR, value of 6, and chroma of 1 or 2. Mottles of red, yellow, or brown range from few to common. The Btg horizon is clay, silty clay, or silty clay loam. Clay content of the upper 20 inches of the Bt horizon ranges from 35 to 60 percent.

The 2Btgb horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 4. The 2Btgb horizon is silt loam, silty clay loam, or clay loam.

The Forestdale soils in Catahoula Parish are taxadjuncts to the Forestdale series because they have buried 2Btgb horizons in the lower solum. This difference, however, does not affect the use and management of the soils.

Guyton Series

The Guyton series consists of poorly drained, slowly permeable soils that formed in loamy alluvium. These soils are on broad flats and in depressional areas on the alluvial plains and alluvial fans of streams that drain the uplands. Some areas of these soils are subject to frequent flooding. Slopes are less than 1 percent. Soils of the Guyton series are fine-silty, siliceous, thermic Typic Glossaqualfs.

The Guyton soils commonly are near Alligator, Oula, Smithdale, and Sweatman soils and are similar to Calhoun soils. Alligator soils are on broader alluvial plains than Guyton soils and have a very-fine control section. Calhoun soils are on loess mantled stream terraces and contain less than 15 percent sand in the control section. Oula, Smithdale, and Sweatman soils are on uplands, are better drained, and do not have an albic horizon that tongues into the argillic horizon.

Typical pedon of Guyton silt loam, frequently flooded; about 9 miles southwest of Harrisonburg on Highway 8, turn right after crossing Bushley Creek, 0.1 mile west of Bushley Creek in a pasture; W1/2 Spanish Land Grant 54, T. 9 N., R. 5 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very friable; many fine roots; medium acid; clear smooth boundary.

Eg1—8 to 18 inches; light brownish gray (10YR 6/2) silt loam; few fine distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very friable; common fine pores; few fine roots; few fine brown concretions; medium acid; clear smooth boundary.

Eg2—18 to 28 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very friable; common fine and medium pores; few fine roots; few fine brown concretions; very strongly acid; clear smooth boundary.

B/E—28 to 40 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine roots; common fine and medium pores; few thin discontinuous clay films on faces of some peds; tongues of light brownish gray (10YR 6/2) silt loam make up about 15 to 20 percent of the horizon; few fine brown concretions; very strongly acid; clear smooth boundary.

Btg1—40 to 55 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; common fine and medium pores; common thin discontinuous clay films on faces of peds; few thin light grayish brown (10YR 6/2) silt coatings on faces of some peds; common fine and medium brown concretions; very strongly acid; clear smooth boundary.

Btg2—55 to 70 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; friable; common fine and medium pores; common thin discontinuous clay films on faces of some peds; few thin light grayish brown (10YR 6/2) silt coatings on faces of some peds; common fine and medium brown concretions; very strongly acid.

Thickness of the solum ranges from 50 to about 80 inches. Sand content ranges from 10 to 40 percent in the control section. Reaction ranges from very strongly acid to medium acid throughout except where the surface layer has been limed. The effective cation exchange capacity of this soil is 50 percent or more saturated with exchangeable aluminum in the control section to a depth of 30 inches or more.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is 4 to 8 inches thick.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is 12 to 25 inches thick. The E horizon is silt loam or very fine sandy loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. Mottles in shades of brown or yellowish brown range from none to many. The Btg horizon is silt loam, silty clay loam, or clay loam.

Some pedons have a BC horizon. It has the same range in colors and textures as the Btg horizon.

Hebert Series

The Hebert series consists of somewhat poorly drained, moderately slowly permeable soils that formed in loamy alluvium deposited by the Arkansas River and possibly the Ouachita River. These soils are mainly on natural levees within the alluvial plain. Most areas of these soils are subject to rare flooding. Some areas of these soils are on point bars along the Ouachita River and are subject to occasional flooding. Slopes range from 0 to 3 percent. Soils of the Hebert series are fine-silty, mixed, thermic Aeric Ochraqualfs.

Hebert soils commonly are near Perry, Rilla, and Sterlington soils and are similar to Dundee soils. Dundee soils are grayer throughout and do not have silt coatings on the faces of peds. Perry soils are in lower positions than Hebert soils and have a fine-textured control section. Rilla and Sterlington soils are in higher positions than Hebert soils and have a reddish subsoil. Sterlington soils are coarse-silty.

Typical pedon of Hebert silt loam; about 10 miles north of Harrisonburg, 1.5 miles east of duty ferry, 52 paces north of a gravel road, 25 paces east of a field road; SW1/4SE1/4 sec. 19, T. 11 N., R. 6 E.

Ap—0 to 4 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

E—4 to 9 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR

5/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; very strongly acid; clear smooth boundary.

Bt1—9 to 17 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; common thin discontinuous clay films on faces of peds; thin light brownish gray (10YR 6/2) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Bt2—17 to 28 inches; reddish brown (5YR 5/4) silty clay loam; common medium prominent grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; common thin discontinuous clay films on faces of peds; thin light brownish gray (10YR 6/2) silt coatings on faces of some peds; very strongly acid; clear smooth boundary.

Bt3—28 to 39 inches; reddish brown (5YR 5/4) loam; few medium distinct strong brown (7.5YR 5/6) and brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; common thin discontinuous clay films on faces of peds; thin light brownish gray (10YR 6/2) silt coatings on faces of some peds; very strongly acid; clear smooth boundary.

Bt4—39 to 48 inches; reddish brown (5YR 4/4) loam; few medium distinct strong brown (7.5YR 5/6) and brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; common thin discontinuous clay films on faces of peds; thin light brownish gray (10YR 6/2) silt coatings on faces of some peds; very strongly acid; clear smooth boundary.

BC—48 to 65 inches; reddish brown (5YR 4/4) silt loam; few medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very friable; few fine pores; few thin discontinuous clay films on faces of peds; thin light brownish gray (10YR 6/2) silt coatings on faces of peds; strongly acid.

Thickness of the solum ranges from 36 to 72 inches. The effective cation exchange capacity of this soil is 50 percent or more saturated with exchangeable aluminum in the control section to a depth of about 30 inches or more.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is silt loam or silty clay loam and ranges in thickness from 4 to 10 inches. Reaction ranges from strongly acid to medium acid except where the surface layer has been limed.

The E horizon, if present, has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. It ranges from 2 to 10 inches thick. Reaction ranges from very strongly acid to medium acid.

The Bt horizon typically has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. Bt subhorizons of some pedons have hue of 10YR, value of 4 to 6, and chroma of 2 or 3. The Bt horizon is loam, silt loam, or silty clay loam. Some of the peds have silt coatings that are as thick as 1 millimeter and have chroma of 1 or 2. Reaction ranges from very strongly acid to slightly acid.

The BC horizon has the same range in colors as the Bt horizon. It is very fine sandy loam, silt loam, or silty clay loam. Reaction ranges from strongly acid to mildly alkaline.

The Hebert soils in map unit Hh are taxadjuncts to the Hebert series because they have grayish brown colors throughout the argillic horizon rather than dominant hue of 7.5YR or 5YR and chroma of 3 or 4. This difference, however, does not affect the use and management of the soils.

Kisatchie Series

The Kisatchie series consists of moderately deep, well drained, very slowly permeable soils that formed in clayey, marine sediment over sandstone or siltstone. These soils are on side slopes on uplands. Slopes range from 5 to 40 percent. Soils of the Kisatchie series are fine, montmorillonitic, thermic Typic Hapludalfs.

Kisatchie soils commonly are near Guyton, Memphis, Oula, Providence, and Smithdale soils. Except for Oula soils, these soils are not underlain by sandstone or siltstone. Guyton soils are in drainageways and are fine-silty. Memphis and Providence soils are on the less sloping ridgetops and are browner in color and fine-silty. Oula soils are in positions that are similar to those of the Kisatchie soils, and they do not have sandstone or siltstone within 40 inches of the surface. Smithdale soils are in higher positions than Kisatchie soils and are fine-loamy.

Typical pedon of Kisatchie silt loam, in an area of Memphis-Kisatchie-Oula association, 5 to 40 percent slopes; 5 miles east of the Ouachita River from Harrisonburg on Highway 8, 0.1 mile west of a gravel road, 25 feet north of highway right-of-way fence, NE1/4SW1/4 sec. 34, T. 10 N., R. 7 E.

A—0 to 6 inches; very dark gray (10YR 3/1) silt loam; weak fine granular structure; friable; many fine and medium roots; very strongly acid; clear smooth boundary.

Bt1—6 to 14 inches; light olive brown (2.5Y 5/4) clay; few fine faint dark brown mottles; moderate medium subangular blocky structure; common fine and medium roots; few coarse roots; common dark brown (10YR 4/3) clay films on faces of peds; firm; very strongly acid; clear smooth boundary.

Bt2—14 to 27 inches; light olive brown (2.5Y 5/4) clay; few fine faint yellowish brown mottles; moderate medium subangular blocky structure; many fine and

medium roots; few coarse roots; common clay films on faces of peds; firm; very strongly acid; clear smooth boundary.

Bt3—27 to 34 inches; light olive brown (2.5Y 5/4) clay; few fine faint yellowish brown mottles; weak medium subangular blocky structure; common fine and medium roots; few coarse roots; few clay films on faces of peds; firm; very strongly acid; clear smooth boundary.

Cr—34 to 60 inches; olive (5Y 5/3) siltstone; common cracks as wide as 3 inches filled with dark grayish brown (10YR 4/2) clay and olive (5Y 5/3) sand; few fine roots in cracks; very strongly acid.

Thickness of the solum ranges from 20 to 40 inches over sandstone or siltstone. Reaction is very strongly acid or strongly acid in the A horizon, and it is extremely acid or very strongly acid throughout the rest of the solum.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. It is 3 to 10 inches thick.

The Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 2 to 4. It is silty clay or clay. Fragments of siltstone or sandstone or thin layers of sandy material are in some pedons.

The Cr horizon is sandstone or siltstone. It has few to many cracks.

Loring Series

The Loring series consists of moderately well drained, moderately slowly permeable soils that formed in loess of late Pleistocene age. A fragipan is in the lower part of the subsoil. These soils are on convex ridges on high and low stream terraces. Some areas of these soils are subject to rare flooding. Slopes range from 0 to 2 percent. Soils of the Loring series are fine-silty, mixed, thermic Typic Fragiudalfs.

Loring soils commonly are near Calhoun, Calloway, and Memphis soils and are similar to Providence soils. Calhoun soils are on broad flats and in depressional areas, and they are gray throughout and do not have a fragipan. Calloway soils are in lower positions than Loring soils and have mottles that have chroma of 2 or less within a depth of 16 inches. Memphis soils are in higher positions than Loring soils and do not have a fragipan. Providence soils have more than 15 percent sand in the lower part of the subsoil.

Typical pedon of Loring silt loam; 4.4 miles north of the intersection of Highways 8 and 15, 1.3 miles southeast from Highway 15, 8 paces north of a field road, 10 paces west of a gravel road; SW1/4 Spanish Land Grant 38, T. 11 N., R. 8 E.

Ap—0 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; very friable; common fine roots; medium acid; clear smooth boundary.

BA—6 to 10 inches; dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; very friable; common fine roots; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt1—10 to 30 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable, few fine roots; few medium random tubular pores; thin discontinuous clay films on faces of peds; few scattered silt coatings on faces of some peds; strongly acid; clear smooth boundary.

Bx1—30 to 37 inches; dark brown (7.5YR 4/4) silt loam; weak coarse prismatic structure parting to weak medium subangular blocky; about 70 percent, by volume, dense and brittle prisms; common fine and medium random tubular pores; thin patchy clay films on faces of peds; strongly acid; clear smooth boundary.

Bx2—37 to 44 inches; dark brown (7.5YR 4/4) silt loam; weak very coarse prismatic structure parting to weak medium subangular blocky; firm and brittle; thin patchy clay films on faces of peds; strongly acid; clear smooth boundary.

Bx3—44 to 52 inches; dark brown (7.5YR 4/4) silt loam; common medium distinct yellowish brown (10YR 5/4) and common medium faint strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; firm and brittle; common fine and medium random tubular pores; thin patchy clay films on faces of peds; strongly acid; clear smooth boundary.

C—52 to 60 inches; dark brown (7.5YR 4/4) silt loam; few medium distinct light yellowish brown (10YR 6/4) mottles; few fine faint strong brown (7.5YR 5/6) mottles; massive, friable; common silt coatings on faces of peds; medium acid.

Thickness of the solum ranges from 45 to 75 inches. Depth to the fragipan ranges from 24 to 35 inches. Sand content generally is less than 5 percent, but it ranges to 15 percent in the lower part of some pedons.

The A horizon is 6 to 8 inches thick. It has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 5. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed.

The BA and Bt horizons have hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. They are silty clay loam or silt loam. Reaction ranges from very strongly acid to medium acid.

The Bx horizon has hue of 7.5YR, value of 4 or 5, and chroma of 3 to 6. Mottles in shades of brown, yellow, and gray range from few to common. The Bx horizon is silty clay loam or silt loam. Reaction ranges from very strongly acid to medium acid.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay

loam. Reaction ranges from very strongly acid to slightly acid.

Lucy Series

The Lucy series consists of well drained, moderately permeable soils that formed in sandy and loamy sediment of Tertiary age. These soils are on ridgetops and side slopes on uplands. Slopes range from 5 to 30 percent. Soils of the Lucy series are loamy, siliceous, thermic Arenic Paleudults.

Lucy soils commonly are near Alaga, Guyton, Kisatchie, Oula, Providence, Smithdale, and Sweatman soils. Alaga and Smithdale soils are in positions similar to those of Lucy soils. Alaga soils are sandy throughout, and Smithdale soils are loamy throughout. Guyton soils are in drainageways and are fine-silty. Kisatchie, Oula, and Sweatman soils are on ridgetops and side slopes and have a fine-textured control section. Providence soils are on ridgetops and are fine-silty.

Typical pedon of Lucy loamy fine sand, in an area of Alaga-Smithdale-Lucy association, 5 to 40 percent slopes; about 9 miles northwest of Harrisonburg, 0.5 mile south from Catahoula Church, left on a gravel road 0.45 mile, 80 feet south of the gravel road, 170 feet east of a logging road; NE1/4NE1/4 sec. 11, T. 10 N., R. 5 E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak fine granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

E—4 to 30 inches; pale brown (10YR 6/3) loamy fine sand; weak fine granular structure; very friable; few fine and medium roots; strongly acid; abrupt smooth boundary.

Bt1—30 to 48 inches; red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—48 to 62 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; few small pockets of pale brown (10YR 6/3) sand grains; strongly acid.

Thickness of the solum is more than 60 inches. Reaction is strongly acid or medium acid in the A and E horizons except where the surface layer has been limed, and it is very strongly acid or strongly acid in the Bt horizon. The effective cation exchange capacity of this soil is 50 percent or more saturated with exchangeable aluminum in the control section to a depth of 30 inches or more.

The A horizon is 4 to 10 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The E horizon is 20 to 35 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It is loamy fine sand or fine sand.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay loam, clay loam, or sandy loam. Mottles in shades of yellow or brown are in some pedons.

Memphis Series

The Memphis series consists of well drained, moderately permeable soils that formed in loess of late Pleistocene age. These soils are on convex slopes on the loess-mantled, low and high stream terraces and on uplands. Slopes range from 0 to 25 percent. Soils of the Memphis series are fine-silty, mixed, thermic Typic Hapludalfs.

Memphis soils commonly are near Calhoun, Calloway, Kisatchie, Loring, Oula, and Smithdale soils. Calhoun soils are in depressional areas and drainageways and are gray throughout. Calloway and Loring soils are in lower and less sloping positions than Memphis soils and have a fragipan. Oula soils are on side slopes, are grayer than Memphis soils, and have a fine-textured control section. Smithdale soils are on side slopes, are redder than Memphis soils, and have a fine-loamy control section.

Typical pedon of Memphis silt loam, 0 to 2 percent slopes; about 1,700 feet south and 2,600 feet east of the intersection of Highways 8 and 15 at Sicily Island, 12 paces south of a field road, 21 paces west of a gravel road; north corner of Spanish Land Grant 40, T. 10 N., R. 8 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; few brownish stains along root channels; weak medium granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

Bt1—5 to 23 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; many fine roots; common fine pores, common thin dark brown (7.5YR 3/4) continuous clay films on faces of peds; few thin silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—23 to 44 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; common thin dark brown (7.5YR 3/4) continuous clay films on faces of peds; few thin silt coatings on faces of peds; strongly acid; clear smooth boundary.

BC—44 to 56 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; very friable; few fine roots; few fine pores; few thin discontinuous clay films on faces of peds; few thin silt coatings on faces of peds; strongly acid; clear smooth boundary.

C—56 to 71 inches; dark brown (7.5YR 4/4) silt loam; massive; very friable; strongly acid.

Thickness of the solum ranges from 40 to 75 inches. The soil contains less than 5 percent sand to a depth of 48 inches or more. Reaction ranges from very strongly acid to medium acid throughout except where the surface layer has been limed.

The A or Ap horizon is 2 to 8 inches thick. It has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

The E horizon, where present, is 2 to 4 inches thick. It has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4.

The Bt horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam or silt loam. Gray or pale brown silt coatings on faces of peds range from none to common.

The BC and C horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. They are silt loam or silty clay loam.

Moreland Series

The Moreland series consists of somewhat poorly drained, very slowly permeable soils that formed in clayey alluvium. These soils are in low positions on the Red River alluvial plain. Slope is less than 1 percent. Soils of the Moreland series are fine, mixed, thermic Vertic Hapludolls.

Moreland soils commonly are near Norwood, Roxana, and Sharkey soils. Norwood and Roxana soils are in higher positions than Moreland soils and are loamy throughout. Sharkey soils are in slightly lower positions than Moreland soils and are gray throughout.

Typical pedon of Moreland clay; about 25 miles south of Jonesville, 0.6 mile north of the Red River Lock and Dam access road, 44 paces west from center of road and 63 paces north of turnrow; SE1/4SE1/4 sec. 5, T. 3 N., R. 5 E.

Ap—0 to 5 inches; dark reddish brown (5YR 3/3) clay; weak medium granular structure; firm; few fine roots; slight effervescence; mildly alkaline; clear smooth boundary.

A2—5 to 12 inches; dark reddish brown (5YR 3/3) clay; moderate medium subangular blocky structure; firm; few fine roots; shiny faces on peds; strong effervescence; mildly alkaline; clear smooth boundary.

Bw1—12 to 23 inches; reddish brown (5YR 4/3) clay; few fine distinct gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm; few fine roots; shiny faces on peds; strong effervescence; mildly alkaline; clear smooth boundary.

Bw2—23 to 46 inches; reddish brown (5YR 4/4) clay; few medium distinct gray (10YR 5/1) mottles; few black stains on some faces of peds; moderate medium subangular blocky structure; firm; few fine roots; few medium soft nodules of lime that have a hard core; strong effervescence; mildly alkaline; clear smooth boundary.

BC—46 to 57 inches; reddish brown (5YR 4/3) clay; few medium distinct gray (10YR 5/1) mottles; weak medium subangular blocky structure; firm; few fine roots; few small slickensides; strong effervescence; mildly alkaline; clear smooth boundary.

C—57 to 67 inches; reddish brown (5YR 4/3) clay; common medium distinct gray (10YR 5/1) mottles; massive; firm; few fine roots; few small slickensides; slight effervescence; neutral.

Thickness of the solum ranges from 40 to 60 inches. Reaction ranges from neutral to mildly alkaline in the A horizon and from neutral to moderately alkaline in the rest of the profile.

The A horizon is 10 to 15 inches thick. It has hue of 5YR, value of 3, and chroma of 2 or 3.

The Bw, BC, and C horizons are clay or silty clay. They have hue of 5YR, value of 3 or 4, and chroma of 3 or 4. Accumulations of carbonates range from none to common.

Necessity Series

The Necessity series consists of somewhat poorly drained, slowly permeable soils that have a fragipan. These soils formed in loamy stream terrace deposits mixed with loess of late Pleistocene age. They are on low ridges and knolls on low stream terraces. These soils are subject to rare flooding. Slopes range from 0 to 2 percent. Soils of the Necessity series are fine-silty, mixed, thermic Glossaquic Fragiudalfs.

Necessity soils commonly are near Bursley, Calhoun, Calloway, and Forestdale soils. Bursley soils are in slightly lower positions than Necessity soils and do not have a fragipan. Calhoun and Forestdale soils are in lower positions than Necessity soils. Calhoun soils are gray throughout. Forestdale soils have a fine-textured control section. Calloway soils are in higher positions than Necessity soils and contain less than 15 percent sand.

Typical pedon of Necessity silt loam, rarely flooded; on the edge of a field at old house place; SE1/4NW1/4 sec. 18, T. 8 N., R. 6 E.

Ap—0 to 5 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; friable, common fine roots; very strongly acid; clear smooth boundary.

Bt1—5 to 19 inches; yellowish brown (10YR 5/4) silty clay loam;, moderate medium subangular blocky structure; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; friable; common fine pores; common fine roots; few black stains; few medium and fine black concretions; common thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B/E—19 to 27 inches; dark yellowish brown (10YR 4/4) silty clay loam (B); light brownish gray (10YR 6/2) silt loam (E) in tongues and interfingers 2 to 10 centimeters wide between peds; common medium distinct brown (7.5YR 5/4) mottles; moderate fine subangular blocky structure; friable; few fine roots; few medium and fine black concretions, few black stains; very strongly acid; clear smooth boundary.

Bx1—27 to 41 inches; dark brown (7.5YR 4/4) loam; few light brownish gray (10YR 6/2) silt coats on faces of peds in upper part; seams, 2 to 10 centimeters wide, of light brownish gray (10YR 6/2) silt loam between prisms; weak coarse prismatic structure parting to moderate medium subangular blocky; few medium distinct yellowish brown (10YR 5/4) mottles; firm and brittle; few fine roots; common fine pores; few medium and fine black concretions; few black stains; common thin discontinuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bx2—41 to 58 inches; dark brown (7.5YR 4/4) clay loam; seams, 2 to 10 centimeters wide, of light brownish gray (10YR 6/2) silt loam between prisms; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle; few fine roots; common thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

BC—58 to 80 inches; dark brown (7.5YR 4/4) clay loam; weak medium subangular blocky structure; friable; few fine roots; few thin discontinuous clay films on faces of peds; very strongly acid.

Thickness of the solum ranges from 50 to 80 inches. Depth to the fragipan ranges from 20 to 37 inches. Reaction ranges from very strongly acid to medium acid throughout. The effective cation capacity of this soil is 20 to 50 percent saturated with exchangeable aluminum in the control section to a depth of 30 inches or more.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is 4 to 10 inches thick.

The Bt horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam or silty clay loam. Mottles in shades of gray, yellow, or brown range from few to many.

The B part of the B/E horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. The E part has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. Concretions of brown or black range from fine to medium and few to common. Mottles in shades of gray, brown, or yellow range from few to many.

The Bx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam or clay loam. Mottles in shades of gray, brown, or yellow and concretions of black or brown range from none to common. The brittle matrix ranges from 60 to 80 percent of the horizontal cross section.

The BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam or clay loam. Gray or brown mottles and concretions of brown or black range from none to common.

Norwood Series

The Norwood series consists of well drained, moderately permeable soils that formed in calcareous, loamy alluvium deposited by the Red River. These soils are on natural levees of the Red River and its distributaries. Unprotected areas of these soils are subject to flooding. Slope is less than 1 percent. Soils of the Norwood series are fine-silty, mixed (calcareous), thermic Typic Udifluvents.

Norwood soils commonly are near Moreland and Roxana soils. Moreland soils are in lower positions than Norwood soils and are clayey throughout. Roxana soils are in slightly higher positions than Norwood soils and contain less clay in the textural control section.

Typical pedon of Norwood silt loam; about 26 miles south of Jonesville, 0.5 mile south of Red River Lock and Dam Road, 90 paces south of landing strip, 11 paces west of a field road; NE1/4NW1/4 sec. 17, T. 3 N., R. 5 E.

Ap—0 to 5 inches; reddish brown (5YR 4/3) silt loam; weak fine granular structure; very friable; few fine roots; mildly alkaline; slight effervescence; abrupt smooth boundary.

A—5 to 9 inches; reddish brown (5YR 4/3) silt loam; weak medium subangular blocky structure; very friable; few fine roots; few fine pores; slight effervescence; mildly alkaline; gradual smooth boundary.

Bw—9 to 17 inches; yellowish red (5YR 4/6) silt loam; weak medium subangular blocky structure; very friable; few fine roots; few fine pores; slight effervescence; mildly alkaline; clear smooth boundary.

C1—17 to 41 inches; yellowish red (5YR 4/6) silt loam; massive; very friable; few fine pores; distinct bedding planes; strong effervescence; moderately alkaline; clear smooth boundary.

C2—41 to 50 inches; yellowish red (5YR 5/6) very fine sandy loam; massive; very friable; distinct bedding planes; strong effervescence; moderately alkaline; clear smooth boundary.

C3—50 to 60 inches; yellowish red (5YR 4/6) silt loam; massive; very friable; distinct bedding planes; strong effervescence; moderately alkaline.

Thickness of the solum ranges from 10 to 24 inches. Reaction is mildly alkaline or moderately alkaline in the A and Bw horizons and moderately alkaline in the C horizon.

The Ap horizon is 4 to 7 inches thick. It has a hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 3 or 4. This horizon is silt loam or silty clay loam. The A horizon, if present, is 3 to 7 inches thick. It is similar to the Ap horizon in color and texture.

The Bw horizon has hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam or silty clay loam.

The C horizon has hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam, silty clay loam, or very fine sandy loam. Thin strata of coarser and finer material are common.

Oula Series

The Oula series consists of well drained, very slowly permeable soils that formed in acid, clayey, marine sediment of Tertiary age. These soils are on side slopes on uplands. Slopes range from 12 to 40 percent. Soils of the Oula series are fine, montmorillonitic, thermic Vertic Hapludalfs.

Oula soils commonly are near Guyton, Kisatchie, Memphis, Providence, and Smithdale soils. Guyton soils are in drainageways and are fine-silty. Kisatchie, Memphis, and Smithdale soils are in positions similar to those of the Oula soils. Kisatchie soils are underlain by sandstone or siltstone at a depth of 20 and 40 inches. Memphis soils are fine-silty, and Smithdale soils are fine-loamy. Providence soils are mainly on ridgetops and are fine-silty.

Typical pedon of Oula very fine sandy loam, in an area of Smithdale-Oula-Providence association, 5 to 40 percent slopes; about 3.9 miles southwest of Harrisonburg, 0.1 mile north on a gravel road from Highway 8, 25 feet east of the gravel road; N1/4 of Spanish Land Grant 40, T. 9 N., R. 6 E.

A—0 to 2 inches; dark grayish brown (10YR 4/2) very fine sandy loam; weak medium granular structure; very friable; common medium and small roots; very strongly acid; clear smooth boundary.

Bt1—2 to 10 inches; light brownish gray (10YR 6/2) clay; moderate medium subangular blocky structure; firm; common thin discontinuous clay films on faces of peds; common medium and fine roots, few large roots; extremely acid; gradual smooth boundary.

Bt2—10 to 34 inches; grayish brown (2.5Y 5/2) clay; moderate medium subangular blocky structure; firm; common thin discontinuous clay films on faces of peds; common medium and fine roots, few large roots; extremely acid; gradual smooth boundary.

Bt3—34 to 43 inches; light brownish gray (2.5Y 6/2) clay; weak medium subangular blocky structure; firm; few thin discontinuous clay films on faces of peds; few medium and fine roots; extremely acid; clear smooth boundary.

C1—43 to 54 inches; light olive brown (2.5Y 5/4) sandy clay; massive; firm; few medium and fine roots; extremely acid; clear smooth boundary.

C2—54 to 66 inches; light olive brown (2.5Y 5/4) loam; massive; few fine roots; few thin strata of broken soft sandstone; common medium and coarse fragments of sandstone; extremely acid; clear smooth boundary.

C3—66 to 74 inches; light olive brown (2.5Y 5/4) sandy clay loam; massive; friable; common medium and coarse fragments of sandstone; very strongly acid.

Thickness of the solum ranges from 25 to 50 inches. Some pedons are underlain by siltstone or sandstone below a depth of 60 inches. The effective cation exchange capacity of this soil is 20 to 50 percent saturated with exchangeable aluminum in the control section to a depth of 30 inches or more.

The A horizon, if present, has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. It is very fine sandy loam, silt loam, or silty clay. Reaction ranges from very strongly acid to medium acid. Erosion has removed the A horizon from some pedons. In other pedons, the A horizon is as thick as 6 inches.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. In some pedons, it has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. The Bt horizon is clay, silty clay, or clay loam. Mottles in shades of brown range from none to common. Reaction ranges from extremely acid to strongly acid. Fragments of soft siltstone or sandstone range from none to common.

The C horizon has the same range in colors as the Bt horizon. It is clay, silty clay, clay loam, sandy clay, sandy clay loam, loam, or silty clay loam. Fragments of soft siltstone or sandstone or thin layers of broken sandstone range from none to common. Reaction ranges from extremely acid to strongly acid.

Perry Series

The Perry series consists of poorly drained, very slowly permeable soils that formed in clayey alluvium deposited by the Arkansas River and possibly the Mississippi and Ouachita Rivers. These soils are in low positions on natural levees. They are subject to flooding. Slopes range from 0 to 1 percent. Soils of the Perry series are very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts.

The Perry soils commonly are near the Alligator and Hebert soils and are similar to Sharkey soils. Alligator soils are in positions similar to those of the Perry soils and are gray throughout. Hebert soils are in higher positions than Perry soils and are loamy throughout. Sharkey soils are in positions similar to those of the Perry soils and are less acid and grayer throughout.

Typical pedon of Perry clay, occasionally flooded; about 7.6 miles north of Harrisonburg, 0.6 mile east of

Big Lake, 23 paces north of field road intersection, 7 paces west of a field road; SE1/4NE1/4 sec. 3, T. 10 N., R. 6 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) clay; weak medium subangular blocky structure; firm; common fine roots; very strongly acid; abrupt smooth boundary.

Bg1—5 to 14 inches; gray (10YR 5/1) clay; many fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; sticky and plastic; few fine roots; very strongly acid; clear smooth boundary.

Bg2—14 to 25 inches; gray (10YR 5/1) clay; common fine faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; sticky and plastic; few fine roots; very strongly acid; clear smooth boundary.

2BC—25 to 46 inches; reddish brown (5YR 4/3) clay; weak medium subangular blocky structure; sticky and plastic; few fine roots; slightly acid; abrupt wavy boundary.

2C—46 to 60 inches; reddish brown (5YR 4/3) clay; few thin strata of silty clay loam and silt loam; massive; few fine concretions of carbonates; moderately alkaline.

Thickness of the solum ranges from 36 to 50 inches. Cracks 1 to 3 centimeters wide develop to a depth of 50 centimeters or more in most years.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It is 4 to 9 inches thick. The Ap or A horizon is clay or silty clay loam. Reaction ranges from very strongly acid to medium acid.

The Bg horizon has hue of 10YR, value of 4 to 6, and chroma of 1. It has few to many brownish mottles. Reaction ranges from very strongly acid to neutral.

The 2BC horizon has hue of 5YR, value of 3 or 4, and chroma of 2 to 4. It ranges from slightly acid to moderately alkaline.

The 2C horizon has hue of 5YR, value of 4 or 5, and chroma of 2 to 4. It contains few to many concretions of carbonates. Reaction ranges from slightly acid to moderately alkaline.

Providence Series

The Providence series consists of moderately well drained, moderately slowly permeable soils that formed in a thin mantle of loess of late Pleistocene age over loamy sediment of Tertiary age. These soils have a fragipan. They are on uplands. Slopes range from 1 to 15 percent. Soils of the Providence series are fine-silty, mixed, thermic Typic Fragiudalfs.

Providence soils commonly are near Guyton, Kisatchie, Loring, Lucy, Oula, and Smithdale soils. Guyton soils are in drainageways and are gray throughout. Kisatchie, Oula, and Smithdale soils are on steeper side slopes than Providence soils. Kisatchie soils are grayish and underlain by sandstone. Oula soils have a clayey control section, and Smithdale soils are fine-loamy. Lucy soils are in positions similar to those of Providence soils and are sandy in the upper part of the solum. Loring soils formed in thicker deposits of loess and are silty throughout.

Typical pedon of Providence silt loam, 1 to 6 percent slopes; about 9 miles west of Harrisonburg, 1 mile south of a church at the intersection on Highway 126, 90 paces east of a woods road, NE1/4SE1/4 sec. 8, T. 9 N., R. 5 E.

A—0 to 3 inches; dark gray (10YR 4/1) silt loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

E—3 to 7 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; very friable; very strongly acid; clear smooth boundary.

Bt1—7 to 12 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular structure; friable; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—12 to 18 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; few fine brown silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt3—18 to 25 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; common fine brown silt coatings on faces of peds; strongly acid; clear smooth boundary.

Btx—25 to 33 inches; strong brown (7.5YR 5/6) silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle; thin patchy clay films on faces of peds; many medium light yellowish brown silt coatings on faces of peds; strongly acid; abrupt smooth boundary.

2Btx—33 to 43 inches; dark yellowish brown (7.5YR 4/6) loam; many medium distinct brown (10YR 5/3) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

2Bt—43 to 60 inches; brown (7.5YR 5/4) loam; common medium faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; few fine black concretions; thin patchy clay films on faces of peds; very strongly acid.

Depth to the fragipan ranges from 20 to 35 inches. Sand content is more than 15 percent within 48 inches of the surface. The soil ranges from very strongly acid to medium acid except in areas that have been limed. The effective cation exchange capacity of this soil is 20 to 50

percent saturated with exchangeable aluminum in the control section to the depth of 30 inches or more.

The A horizon is 2 to 5 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 1 to 3.

The E horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. It is 4 to 7 inches thick.

The Bt horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 7.5YR, value of 4 or 5, and chroma of 4, 6, or 8; or hue of 10YR, value of 5, and chroma of 6 or 8. The texture is silt loam or silty clay loam.

The Btx and 2Btx horizons have hue of 7.5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 10YR, value of 5, and chroma of 6 or 8. The upper part of the fragipan is silt loam or silty clay loam that has evident amounts of sand. The lower part is loam, clay loam, sandy clay loam, or sandy loam. The fragipan is firm or very firm when dry and brittle when moist.

The 2Bt horizon ranges from red to gray and is sandy loam, loam, sandy clay loam, or clay loam.

Rilla Series

The Rilla series consists of well drained, moderately permeable soils that formed in loamy alluvium deposited by the Arkansas River. These soils are on natural levees within the alluvial plain and are subject to rare flooding. Slope is less than 1 percent. Soils of the Rilla series are fine-silty, mixed, thermic Typic Hapludalfs.

Rilla soils commonly are near Hebert and Sterlington soils and are similar to Memphis soils. Hebert soils are in lower positions than Rilla soils and are grayer in the upper part of the argillic horizon. Memphis soils contain less than 10 percent total sand and are on loess mantled uplands and terraces. Sterlington soils are in slightly higher positions than Rilla soils and are coarse-silty.

Typical pedon of Rilla silt loam; about 11.5 miles northwest of Harrisonburg, 150 feet south of the Ouachita River, 100 feet east of Duty Ferry Road; SW1/4SW1/4 sec. 24, T. 11 N., R. 5 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; very friable; common fine roots; very strongly acid; abrupt smooth boundary.

Bt1—6 to 15 inches; reddish brown (5YR 5/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; few light brown (7.5YR 6/4) silt coatings on vertical faces of peds; extremely acid; clear smooth boundary.

Bt2—15 to 25 inches; yellowish red (5YR 5/6) silt loam; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; common light brown (7.5YR 6/4) silt coatings on vertical faces of peds; very strongly acid; clear smooth boundary.

Bt3—25 to 41 inches; yellowish red (5YR 5/6) silt loam; few fine faint yellowish red mottles; weak medium subangular blocky structure; friable; few fine black concretions; thin patchy clay films on faces of peds; common pale brown (10YR 6/3) silt coatings on vertical faces of peds; very strongly acid; clear smooth boundary.

BC—41 to 49 inches; reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure; friable; few medium random tubular pores, few fine black concretions; few thin patchy clay films on faces of peds; common pale brown (10YR 6/3) silt coatings on vertical faces of peds; strongly acid; clear wavy boundary.

2C—49 to 60 inches; reddish brown (5YR 4/3) silty clay loam; massive; firm; common fine black concretions; medium acid.

Thickness of the solum ranges from 40 to 60 inches. The effective cation exchange capacity of this soil is 20 to 50 percent saturated with exchangeable aluminum in the control section to a depth of 30 inches or more.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is 4 to 6 inches thick. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed.

The Bt and BC horizons have hue of 5YR, value of 4 or 5, and chroma of 4 or 6. They are silt loam, silty clay loam, or clay loam. Reaction ranges from extremely acid to strongly acid.

The C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3, 4, or 6. It is silty clay loam or loam. Reaction ranges from very strongly acid to neutral.

Roxana Series

The Roxana series consists of well drained, moderately permeable soils that formed in loamy alluvium deposited by the Red River. These soils are mainly on high parts of natural levees of the Red River. Most areas of these soils are protected from flooding. Some areas are on sandbars along the Red River and are subject to frequent flooding. Slopes range from 0 to 3 percent. Soils of the Roxana series are coarse-silty, mixed, nonacid, thermic Typic Udifluvents.

Roxana soils commonly are near Norwood soils and are similar to Sterlington soils. Norwood soils are in slightly lower positions than Roxana soils and are fine-silty. Sterlington soils are on natural levees of the Ouachita River and have an argillic horizon.

Typical pedon of Roxana very fine sandy loam; about 28 miles south of Jonesville, 150 feet south of southwest corner of levee, in a field; NW1/4NE1/4 sec. 15, T. 3 N., R. 5 E.

Ap—0 to 6 inches; yellowish red (5YR 4/6) very fine sandy loam; weak medium granular structure; very

friable; few fine roots; mildly alkaline; clear smooth boundary.

C1—6 to 14 inches; yellowish red (5YR 5/6) very fine sandy loam; massive; very friable; few fine roots; common fine and medium bedding planes; moderately alkaline; clear smooth boundary.

C2—14 to 24 inches; yellowish red (5YR 5/6) very fine sandy loam; massive; very friable; common fine bedding planes; moderately alkaline; clear smooth boundary.

C3—24 to 52 inches; yellowish red (5YR 5/6) very fine sandy loam; massive; very friable; common fine bedding planes; slight effervescence; moderately alkaline; clear smooth boundary.

C4—52 to 67 inches; yellowish red (5YR 5/6) very fine sandy loam; massive; very friable; slight effervescence; moderately alkaline.

Bedding planes are evident in the 10- to 40-inch control section. Reaction ranges from neutral to moderately alkaline throughout the profile. Clay content is less than 18 percent throughout the 10- to 40-inch control section.

The A horizon has hue of 7.5YR or 5YR, value of 3 or 4, and chroma of 3, 4, or 6. It is 3 to 8 inches thick.

The C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4, 6, or 8. It is very fine sandy loam, loamy very fine sand, or silt loam. Some pedons have thin strata of finer or coarser textured material.

Sharkey Series

The Sharkey series consists of poorly drained, very slowly permeable soils that formed in clayey alluvium deposited mainly by the Mississippi River. These soils are in low positions on natural levees and in depressional areas. Unprotected areas of these soils are subject to flooding. Slope is less than 1 percent. Soils of the Sharkey series are very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts.

Sharkey soils commonly are near Dundee, Fausse, and Tensas soils and are similar to Alligator and Perry soils. Alligator and Perry soils are in positions similar to those of the Sharkey soils. Alligator soils are more acid than Sharkey soils. Perry soils are reddish colored in the lower part of the subsoil. Dundee and Tensas soils are in higher positions than Sharkey soils. Dundee soils are fine-silty. Tensas soils are loamy in the lower part of the subsoil. Fausse soils are in lower positions than Sharkey soils and do not dry enough to crack so deeply as 20 inches below the surface in most years.

Typical pedon of Sharkey clay, about 8 miles southwest of Jonesville, 1.75 miles north on a field road from Delta Farms gin, 130 feet west of road at ditch crossing; SE1/4NW1/4 sec. 1, T. 6 N., R. 5 E.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) clay; weak fine granular structure; firm; few fine roots; medium acid; abrupt smooth boundary.

Bg1—4 to 8 inches; gray (10YR 5/1) clay; common fine and medium yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; medium acid; clear smooth boundary.

Bg2—8 to 19 inches; gray (10YR 5/1) clay; common fine and medium reddish brown (5YR 5/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; slightly acid; clear smooth boundary.

Bg3—19 to 29 inches; gray (10YR 5/1) clay; common fine dark brown (10YR 4/3) mottles; moderate medium subangular blocky structure; firm; neutral; clear smooth boundary.

BC—29 to 44 inches; gray (10YR 5/1) clay; few fine reddish brown (5YR 5/4) mottles; weak medium subangular blocky structure; firm; mildly alkaline; clear smooth boundary.

Cg—44 to 60 inches; gray (10YR 5/1) clay; common fine dark brown (10YR 4/3) mottles; massive; firm; mildly alkaline.

Thickness of the solum ranges from 36 to 60 inches. Cracks 1 to 3 centimeters wide develop to a depth of 50 to 60 centimeters in most years. COLE ranges from 0.1 to 0.17 in the Bg horizon.

The A horizon is 4 to 12 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. An A horizon that has a value of 3 is less than 10 inches thick. Reaction ranges from medium acid to moderately alkaline.

The Bg and BC horizons have hue of 10YR or 5Y, value of 4 to 6, and chroma of 1, or it is neutral. Mottles in shades of brown, yellow, and red range from few to many. Reaction ranges from medium acid to moderately alkaline.

The Cg horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1, or it is neutral. It is typically clay or silty clay, and it is silty clay loam below a depth of 40 inches in some pedons. Reaction ranges from neutral to moderately alkaline. Some pedons have a buried, clayey A horizon below a depth of 20 inches.

The Sharkey soils in map unit Sn are taxadjuncts to the Sharkey series because they have an A horizon that has a redder hue than allowed in the Sharkey series. This difference does not affect use and management.

Smithdale Series

The Smithdale series consists of well drained, moderately permeable, loamy soils on ridgetops and side slopes of uplands. These soils formed in loamy marine or fluvial sediment of Tertiary or early Pleistocene age. Slopes range from 5 to 40 percent. Soils of the Smithdale series are fine-loamy, siliceous, thermic Typic Hapludults.

Smithdale soils commonly are near Alaga, Guyton, Kisatchie, Lucy, Memphis, Oula, Providence, and Sweatman soils. Alaga, Kisatchie, Lucy, Memphis, Oula, Providence, and Sweatman soils are in positions similar to those of the Smithdale soils. Guyton soils are in drainageways and are fine-silty and gray throughout. Alaga soils are sandy throughout. Kisatchie soils are clayey and are underlain by sandstone. Lucy soils are sandy to a depth of from 20 to 40 inches. Memphis soils are fine-silty and brownish. Oula and Sweatman soils have a fine-textured control section. Providence soils are fine-silty and have a fragipan.

Typical pedon of Smithdale fine sandy loam, in an area of Smithdale-Oula-Providence association, 5 to 40 percent slopes; about 0.5 mile west of Harrisonburg, 0.5 mile west on a gravel road from Highway 124, north 275 feet from road on right side of narrow ridgetop; northern edge of Spanish Land Grant 37, T. 9 N., R. 6 E.

A—0 to 5 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; few fine roots; common gravels; very strongly acid; clear smooth boundary.

E—5 to 10 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; very friable; few fine, medium, and coarse roots; common gravels; very strongly acid; clear smooth boundary.

Bt1—10 to 26 inches; red (2.5YR 4/8) sandy clay loam; moderate coarse subangular blocky structure; friable; few medium and coarse roots; common thin clay films on faces of peds; common gravels; very strongly acid; gradual smooth boundary.

Bt2—26 to 44 inches; red (2.5YR 5/8) sandy loam; moderate coarse subangular blocky structure; friable; few medium and fine roots; common thin clay films on faces of peds; common gravels; very strongly acid; gradual smooth boundary.

Bt3—44 to 80 inches; yellowish red (5YR 5/8) sandy loam; moderate coarse subangular blocky structure; friable; few medium roots; common thin clay films on faces of peds; common gravels; few pockets of uncoated sand grains; very strongly acid.

Thickness of the solum ranges from 60 inches to more than 100 inches. All horizons are very strongly acid or strongly acid. The effective cation exchange capacity of this soil is 20 to 50 percent saturated with exchangeable aluminum in the control section to a depth of 30 inches.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. It is 2 to 10 inches thick.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It typically is 2 to 8 inches thick. The E horizon is fine sandy loam, sandy loam, or loamy sand. Some pedons do not have an E horizon.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay loam, clay loam, or loam in the upper part and sandy loam or loam in the lower part. Content of gravel ranges from none to about 10 percent of the volume.

Sostien Series

The Sostien series consists of poorly drained, very slowly permeable soils on bottom lands. These soils are forming in sediment dredged from canals or rivers or from land surfaces during construction of canals or waterways. Areas of these soils not protected by levees are subject to occasional flooding. Slopes range from 0 to 3 percent. Soils of the Sostien series are fine, montmorillonitic, nonacid, thermic Vertic Fluvaquents.

Sostien soils commonly are near Dundee, Sharkey, and Tensas soils. Dundee soils are in higher positions than Sostien soils, have an argillic horizon, and are fine-silty. Sharkey and Tensas soils formed in undisturbed soil material and have cambic or argillic horizons.

Typical pedon of Sostien clay, occasionally flooded; about 16 miles south of Jonesville, 2.5 miles west on Catahoula Lake Diversion Channel road, 120 feet southwest of the road on a trail, 100 feet southeast of the trail; SE1/4SE1/4 sec. 19, T. 5 N., R. 6 E.

A—0 to 4 inches; dark gray (10YR 4/1) clay; weak medium subangular blocky structure; firm, plastic and sticky; common fine roots; neutral; clear smooth boundary.

Cg—4 to 60 inches; gray (10YR 5/1) clay; many fine and medium yellowish red (5YR 4/6) mottles; massive; firm, sticky and plastic; common fine and medium roots; few thin strata of brown (10YR 5/3) very fine sandy loam; common bedding planes; neutral.

Reaction is slightly acid or neutral. Most pedons are saturated with water from December through April.

The A horizon is 2 to 6 inches thick. It is clay, silty clay, or silty clay loam. The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 3.

The Cg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It is clay or silty clay and contains few to many strata of very fine sandy loam or silt loam that are from 1/4 inch to 2 inches thick. Some pedons contain strata of reddish material dredged from buried Arkansas River sediment.

Sterlington Series

The Sterlington series consists of well drained, moderately permeable soils that formed in loamy alluvium deposited by the Arkansas River. These soils are on natural levees within the alluvial plain and are subject to rare flooding. Slope is less than 1 percent. Soils of the Sterlington series are coarse-silty, mixed, thermic Typic Hapludalfs.

Sterlington soils commonly are near Hebert and Rilla soils and are similar to Memphis soils. Hebert and Rilla

soils are in slightly lower positions than Sterlington soils and are fine-silty. Memphis soils are on terraces and uplands and are fine-silty.

Typical pedon of Sterlington silt loam; about 2.25 miles northeast of Harrisonburg, 300 feet north of a fence row, 60 feet west of a gravel road; NE1/4SE1/4 sec. 31, T. 10 N., R. 7 E.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; very friable, common fine roots; medium acid; clear smooth boundary.

E—7 to 12 inches; brown (7.5YR 5/4) very fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; few fine pores; very strongly acid; clear smooth boundary.

Bt1—12 to 33 inches; reddish brown (5YR 5/4) very fine sandy loam; common medium distinct yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; very friable; few fine roots; common fine pores; common thin clay films on faces of peds; thin reddish brown (5YR 5/3) silt coatings (E material) on faces of some peds; very strongly acid; clear smooth boundary.

Bt2—33 to 54 inches; yellowish red (5YR 5/6) very fine sandy loam; moderate medium subangular blocky structure; very friable; few fine roots; common fine pores; common thin clay films on faces of peds; thick reddish brown (5YR 5/3) silt coatings (E material) between peds; very strongly acid; clear smooth boundary.

C—54 to 66 inches; stratified yellowish red (5YR 5/6) very fine sandy loam and reddish brown (5YR 4/4) clay; massive; very friable and firm; strongly acid.

Thickness of the solum ranges from 36 to 60 inches. The effective cation exchange capacity of this soil is 20 to 50 percent saturated with exchangeable aluminum in the control section to a depth of 30 inches or more.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3; or hue of 10YR, value of 5, and chroma of 3; or hue of 7.5YR, value of 4 or 5, and chroma of 2 or 4. It is 4 to 8 inches thick. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed.

The E horizon is 2 to 6 inches thick. It has hue of 7.5YR or 10YR, value of 5, and chroma of 2 to 4. Reaction ranges from very strongly acid to medium acid. The E horizon is very fine sandy loam or silt loam.

The Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6. At least one subhorizon of the Bt has hue of 5YR. Reaction ranges from very strongly acid to slightly acid. Subhorizons contain ped coatings and pockets of E material that comprise less than 30 percent of the horizon. The E material has chroma of 3 or more and value that is 1 or 2 units higher or has chroma that is 1 or 2 units lower than the chroma of the Bt horizon. The Bt horizon is very fine sandy loam or silt loam.

The C horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6. It is very fine sandy loam, silt loam, silty clay loam, or clay. Reaction ranges from very strongly acid to moderately alkaline.

Sweatman Series

The Sweatman series consists of well drained, moderately slowly permeable soils that formed in stratified loamy and clayey marine sediment of Tertiary age. These soils are on ridgetops and side slopes of uplands. Slopes range from 12 to 40 percent. Soils of the Sweatman series are clayey, mixed, thermic Typic Hapludults.

Sweatman soils commonly are near Bayoudan, Guyton, Lucy, and Smithdale soils. Bayoudan, Lucy, and Smithdale soils are in positions similar to those of Sweatman soils. Guyton soils are in drainageways and are fine-silty and gray throughout. Bayoudan soils have a very-fine textured control section. Lucy soils have a solum that is sandy in the upper part. Smithdale soils are loamy throughout.

Typical pedon of Sweatman fine sandy loam, in an area of Sweatman-Smithdale association, 5 to 40 percent slopes; about 9 miles northwest of Harrisonburg, 0.75 mile south from Highway 124 on a gravel road, in road cut; north corner of Spanish Land Grant 38, T. 11 N., R. 5 E.

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) fine sandy loam; weak medium granular structure; very friable; common fine roots; very strongly acid; clear smooth boundary.

A2—1 to 4 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots, few coarse roots; strongly acid; clear wavy boundary.

Bt1—4 to 12 inches; yellowish red (5YR 5/6) clay; few fine distinct red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; common fine and medium roots, few coarse roots; common distinct shiny ped faces; very strongly acid; gradual smooth boundary.

Bt2—12 to 25 inches; reddish brown (5YR 5/4) silty clay; common medium prominent brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; common fine and medium roots, few coarse roots; common distinct yellowish red (5YR 5/8) clay films on faces of peds; few fine mica flakes; strongly acid; gradual smooth boundary.

C—25 to 62 inches; stratified light yellowish brown (2.5Y 6/4) shaly clay and brownish yellow (10YR 6/6) very fine sandy loam containing common fine mica flakes; massive; common fine and medium roots, few coarse roots; very strongly acid.

Thickness of the solum ranges from 20 to 40 inches. Reaction is very strongly acid or strongly acid throughout. The effective cation exchange capacity of this soil is 50 percent or more saturated with aluminum in the control section to a depth of 30 inches or more.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is 2 to 6 inches thick.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6. It is clay, silty clay, or silty clay loam. Gray weathered fragments of shale range from none to many.

The BC or CB horizon, if present, has colors similar to the Bt horizon or is mottled in shades of red, gray, or yellow. It is clay, clay loam, silty clay loam, loam, or sandy loam. In some pedons, the BC horizon consists of soft weathered shale that has relict plate-like rock structure.

The C horizon is in various shades of gray, red, and brown. It is stratified shaly clay and very fine sandy loam, fine sandy loam, or loam.

Tensas Series

The Tensas series consists of somewhat poorly drained, very slowly permeable soils that formed in clayey alluvium deposited by the Mississippi River. These soils are on natural levees of abandoned Mississippi River channels. Unprotected areas of these soils are subject to flooding. Slopes range from 0 to 5 percent. Soils of the Tensas series are fine, montmorillonitic, thermic Vertic Ochraqualfs.

Tensas soils commonly are near Alligator, Dundee, Forestdale, and Sharkey soils. Alligator and Sharkey soils are in lower positions than Tensas soils and are clayey throughout. Dundee soils are in higher positions than Tensas soils and are loamy throughout. Forestdale soils are in positions similar to those of the Tensas soils and have a dominant color chroma of 1 in the Bt horizon.

Typical pedon of Tensas silty clay, occasionally flooded; about 7 miles south of Sicily Island, 1.1 miles east of Cash Bayou Church on Highway 921, northwest on a field road to gap in fence, 18 paces southwest of the gap; NE1/4SW1/4 sec. 23, T. 9 N., R. 8 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; common fine roots; medium acid; clear smooth boundary.

Bt1—5 to 10 inches; dark grayish brown (10YR 4/2) silty clay; common fine distinct strong brown (7.5YR 5/6) mottles and few fine distinct dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; plastic; few fine roots; common medium random tubular pores; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—10 to 22 inches; grayish brown (10YR 5/2) silty clay; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; plastic; few fine roots; few fine random tubular pores; few fine black concretions; thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

2BC1—22 to 26 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; friable; few fine random tubular pores; few fine black concretions; thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

2BC2—26 to 33 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct strong brown (7.5YR 4/6) mottles and common fine and medium faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; very friable; few fine random tubular pores; few fine black concretions; thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

2BC3—33 to 47 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few medium and coarse and common fine random tubular pores; few fine black concretions; thin discontinuous clay films on faces of peds; gray (10YR 5/1) coatings on faces of peds; strongly acid; discontinuous wavy boundary.

2C—47 to 60 inches; brown (10YR 5/3) silt loam; common fine strong brown (7.5YR 4/6) mottles; massive; very friable; strongly acid.

Thickness of the solum ranges from 30 to 50 inches. Depth to the loamy 2BC horizon ranges from 20 to 36 inches.

The A horizon is 3 to 8 inches thick. It has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. Reaction ranges from very strongly acid to medium acid. The A horizon is silty clay, clay, or silty clay loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The surfaces of peds of some pedons are dark gray or gray. The Bt horizon is silty clay or clay. Reaction ranges from very strongly acid to medium acid. Some pedons have subhorizons between the Ap horizon and a depth of 30 inches that are dark gray (10YR 4/1) or gray (10YR 5/1).

The 2BC horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The surfaces of peds in some pedons are dark gray or gray. The 2BC horizon is silty clay loam, silt loam, or very fine sandy loam. Reaction ranges from strongly acid to slightly acid.

The 2C horizon has the same range in color, texture, and reaction as the 2BC horizon.

Formation of the Soils

In this section, the processes and factors of soil formation are discussed and related to the soils in the survey area.

Processes of Soil Formation

The processes of soil formation influence the kind and degree of development of soil horizons. The rate and relative effectiveness of different processes are determined by the factors of soil formation—parent material, climate, living organisms, relief, and time.

Important soil-forming processes are those that result in additions of organic, mineral, and gaseous materials to the soil; losses of these same materials from the soil; translocation of materials from one point to another within the soil; and physical and chemical transformation of mineral and organic materials within the soil *(11)*. Many processes take place simultaneously. Examples in the survey area include accumulation of organic matter, development of soil structure, formation and translation of clay, and leaching of bases from some soil horizons. Some important processes that have contributed to the formation of soils in Catahoula Parish are discussed in the following paragraphs.

Organic matter has accumulated and has been partly decomposed and mixed into all the soils. Organic matter production is greatest in and above the surface horizon. This results in the formation of soils in which the surface horizon is higher in organic matter content than the deeper horizons. Decomposition and mixing of organic residue into the soil horizons are brought about largely by the activity of living organisms. Many of the more stable products of decomposition remain as finely divided material that contributes dark color to the soil, increases the available water-holding and cation exchange capacities, contributes to granulation, and serves as a source of plant nutrients. In Catahoula Parish, the conversion of woodland and pasture areas to cropland has reduced the content of organic matter in many of the soils.

The addition of alluvial sediment at the surface has been important in the formation of some of the soils in the parish. Added sediment provides new parent material in which processes of soil formation then occur. In many cases, new material accumulated faster than the processes of soil formation could appreciably alter it. The evident depositional strata in the Roxana soils are a result of accumulation of this sort. In some cases, manmade or geological changes cause streams to overflow and deposit sediment on soils that had already been appreciably altered by the processes of formation. This situation is evident in the profile of the Bursley soils in which a well developed soil is being buried by additions of alluvial sediment to the surface. Additions of alluvial sediment are also occurring in flooded areas of the Alligator, Moreland, and Perry soils.

Processes resulting in development of soil structure have taken place in all the soils. Plant roots and other organisms are effective agents in the rearrangement of soil material into secondary aggregates. Decomposition products or organic residue, secretions of organisms, clays, and oxides of elements, such as iron, that form during soil development all serve as cementing agents that help stabilize structural aggregates.

Alternate wetting and drying and shrinking and swelling contribute to the development of structural aggregates. This is particularly effective in soils, such as Sharkey soils, that have large amounts of clay.

The poorly drained and very poorly drained soils in the survey area have horizons in which reduction and segregation of iron and manganese compounds is an important process. Reducing conditions prevail for long periods in poorly aerated horizons. Consequently, the relatively soluble reduced forms of iron and manganese predominate over the less soluble oxidized forms. Reduced forms of these elements result in the gray colors that are characteristic in the subsoil of the Alligator, Calhoun, Fausse, and Sharkey soils. In the more soluble reduced forms, appreciable amounts of iron and manganese can be removed from the soils or translocated from one position to another within the soil by water. Browner mottles in predominantly gray horizons indicate segregation and concentration of oxidized iron compounds that result from alternate oxidizing and reducing conditions in the soils. Some well drained soils, such as Kisatchie and Oula soils, formed in gray parent material, and they are not presently in a wet, reducing environment.

Water moving through the soil has leached soluble bases and any free carbonates that may have been initially present from some horizons of most of the soils. The effects of leaching are least pronounced in the Moreland, Norwood, Roxana, and Sostien soils. The soils have developed in relatively young parent material that initially contained free calcium carbonate. All of

these soils except the Sostien soil contain free calcium carbonate. Some of the soils, such as the Alligator, Bayoudan, Fausse, Perry, and Sharkey soils, are more leached. The surface horizon of these soils is acid, and the subsoil is neutral or alkaline. All of the other soils in the parish are typically acid throughout.

The formation, translocation, and accumulation of clay in the profile have been important processes during the development of all of the soils in the parish but the Alaga, Alligator, Bayoudan, Fausse, Norwood, Perry, Roxana, Sharkey, and Sostien soils. Silicon and aluminum, released as a result of weathering of such minerals as pyroxenes, amphiboles, and feldspar, can recombine with the components of water to form secondary clay minerals, such as kaolinite. Layer silicate minerals, such as biotite and montmorillonite, can also weather to form other clay minerals, such as vermiculite or kaolinite. Horizons of secondary accumulation of clay result largely from translocation of clays from upper to lower horizons. As water moves downward, it can carry small amounts of clay in suspension. This clay is deposited, and it accumulates at the depths of penetration of the water or in horizons where it becomes flocculated or filtered out by fine pores in the soil. Over long periods, such processes can result in distinct horizons of clay accumulation. Secondary accumulation of calcium carbonate occurs in the lower part of the solum in some of the soils. Carbonates dissolved from overlying horizons have been translocated to this depth by water and redeposited. Calcium carbonate is present in the lower part of the Moreland, Norwood, Perry, and Roxana soils in most locations.

Factors of Soil Formation

Soil is produced by soil-forming processes acting on material deposited or accumulated by geologic forces.

The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material, the climate under which the soil has accumulated and existed since accumulation, the plant and animal life on and in the soil, the relief, and the length of time these forces of soil formation have acted on the soil material *(7)*.

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material also affects the kind of soil profile that is formed and, in some cases, determines it almost entirely. Finally, time is needed to change the parent material into a soil profile. In most cases, a very long time is needed to develop distinct soil horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. In the following paragraphs the factors of soil formation are discussed as they relate to soils in the survey area.

Climate

Catahoula Parish is in a region characterized by a humid, subtropical climate. Detailed climatological data is given in the section "General Nature of the Survey Area."

A relatively uniform climate throughout the parish does not account for differences among the soils within the parish. The warm, moist climate promotes rapid soil formation. High precipitation rates promote rapid weathering of readily weatherable minerals and the movement of colloidal material downward in the soil. Plant remains decompose rapidly in the warm climate. This prevents the formation of soils that have high organic matter content. The organic acids produced by decomposition hasten development of clay minerals and removal of carbonates. Soil development is increased because the soil is seldom frozen for prolonged periods.

Living Organisms

Plants, animals, insects, bacteria, fungi, other micro-organisms, and man are important in the formation of the soils of Catahoula Parish. Plant growth and animal activity physically alter the soil. Man, with his land clearing and cultivation of crops, also physically alters the surface horizon of the soils.

The native vegetation in bottom lands and on low terraces of the parish was primarily hardwood forests. Native vegetation on the uplands was primarily mixed hardwood and pine forests. Soils developed under mixed hardwood and pine forests are generally lower in organic matter content and have a more distinct E horizon than soils developed under hardwood forests.

Bacteria, fungi, and other micro-organisms are primarily responsible for decomposition of organic matter and oxidation-reduction reactions that affect the physical and chemical properties of the soils. Aerobic bacteria, more abundant in well drained soils, decompose organic matter rapidly. Anerobic bacteria, more abundant in poorly drained soils, decompose organic matter slowly. This results in lower organic matter content in well drained soils than in those that are poorly drained.

Parent Material

Parent material is the mass from which soil develops. It affects the color, texture, permeability, mineralogy, and the erosion potential of the soil.

The soils of Catahoula Parish formed in alluvium deposited by the Mississippi, Arkansas, Ouachita, and Red Rivers and by local streams. They also formed in wind blown material (loess) and Pleistocene and Tertiary

sediment of the Citronell, Catahoula, Vicksburg, and Jackson Formations (3).

The characteristics, distribution, and depositional pattern of the different parent material in the parish are discussed in more detail in the section "Landforms and Surface Geology."

Relief

Relief influences soil formation by affecting soil drainage, runoff, erosion, deposition, and soil temperature. The influence of relief on soils in Catahoula Parish is especially evident in the rates at which water runs off the surface, in the internal soil drainage, and in the depth to a seasonal high water table. For example, relief on the Memphis, Loring, Calloway, and Calhoun soils, which formed in loess, is progressively less in the order in which the soils are listed. The same order also indicates progressively lower elevations. For example, Memphis soils are in the highest positions and are well drained. Runoff is medium or rapid, and the seasonal high water table is at a depth of more than 6 feet. The Calhoun soils are in the lowest positions and are poorly drained. Runoff is slow, and a seasonal high water table fluctuates between a depth of about 2 feet and the soil surface.

In some areas of the uplands the relief is great and slopes are steep. Runoff is rapid, and little water enters the soil. Erosion is occurring on soils in these areas at rates nearly equal to soil formation. This accounts for the relatively thin sola of the Bayoudan, Kisatchie, Oula, and Sweatman soils.

Time

The formation of soils requires many years for changes to take place in the parent material. A soil's age, however, is determined by the degree of development of the soil profile. Soils that have little profile development are immature, and those that have well expressed soil profiles are mature.

Generally the longer the parent material has remained in place, the more fully developed the soil profile. In Catahoula Parish, parent material ranges in age from a few hundreds of years to many millions of years.

The youngest soils, such as Moreland, Norwood, and Roxana soils, formed in recent alluvium that was deposited by overflows from the Red River during the last 500 years. These soils have relatively weakly expressed soil horizons. Some of the soils, such as Dundee, Forestdale, Hebert, and Rilla soils, are forming in alluvium that has been in place for as long as 7,000 years. These soils have developed distinct horizons.

The oldest soils in the parish are those on the uplands that formed in parent material ranging in age from 20,000 years to perhaps 45 million years (3).

Landforms and Surface Geology

The soils of Catahoula Parish formed in many kinds of unconsolidated parent material. This parent material can be placed in four general groups based upon their nature, source, and age: Recent Alluvium, loess, sediment of late Pleistocene age or younger, and sediment of early Pleistocene and Tertiary age. These four groups of parent material generally correspond with the four distinct geomorphic land surfaces of the parish. These are the alluvial plains, high stream terraces (Macon Ridge), low stream terraces (Wallace Ridge), and the uplands, respectively. Elevations range from slightly less than 40 feet above mean sea level on the alluvial plains to about 315 feet on Bald Hill on the uplands.

The major surface features, geology, and relative ages of the parent material in these areas are discussed in the following paragraphs.

Recent Alluvium

The alluvial plains make up about 69 percent of the parish. The parent material for the soils on the alluvial plains consists of recent alluvium from the Mississippi River, the Ouachita/Arkansas River System, the Red River, and from smaller local streams.

The initial differences in sediment carried by these rivers and streams and the partial sorting of the sediment during deposition result in wide differences in the recent alluvium throughout the alluvial plains. The sediment is partly sorted each time the waters overspread the streambanks. When the water slows, it first drops sand, then silt, and finally clay particles. Thus, the alluvium on the natural levees along streams has high content of sand. The most clayey alluvium is in the backswamps where sediment was deposited by still or slowly moving water. Characteristically, this depositional pattern results in the formation of long, nearly level slopes that extend from the natural levees near the stream to the clayey backswamps. Gently undulating ridge and swale topography, intricate and complex drainage patterns, and a lack of drainage outlets in low areas are other common features within the alluvial plains.

About 77 percent of the alluvial plains in Catahoula Parish contains alluvium deposited by present and former channels of the Mississippi River. About 13 percent contains alluvium deposited by the Ouachita/Arkansas River System, about 3 percent by the Red River, and 7 percent by smaller local streams. The alluvium deposited by each of the river systems is discussed in the following paragraphs.

The *Mississippi River alluvium* is primarily from the Tensas/Black River System that was abandoned by the Mississippi River about 2,600 years ago (10). Some geologists and pedologists believe that some Mississippi River alluvium may have come down the present day

Ouachita/Arkansas River valley from a point north of the Macon Ridge where Arkansas River now enters the Mississippi River.

Alluvium carried by the Mississippi River may have originated anywhere within the river's large drainage area. Sorting during deposition, as well as a diverse mineralogy, results in considerable differences in the soils formed from this alluvium.

The alluvial plains that are dominated by alluvium from the Mississippi River range in elevation from slightly below 40 feet to slightly above 65 feet mean sea level. Nearly level topography that has local relief of about 15 feet characterize the area. The Tensas and Black Rivers occupy former channels of the Mississippi River. These channels are cut to 20 to 40 feet or more below the adjacent alluvium.

The loamy surface alluvium probably accumulated about 3,800 to 2,600 years ago when the Mississippi River's full flow occupied the channels of the Tensas and Black Rivers. The clayey alluvium accumulated during that period and during more recent times.

In northern Catahoula Parish along the Boeuf River, the gray, clayey sediment presumed to have been deposited by the Mississippi River is generally less than 6 feet thick and is underlain by reddish clayey sediment deposited by the Arkansas River at an earlier date. No loamy Mississippi River sediment is in this area.

In Catahoula Parish, the Dundee, Tensas, Sharkey, Alligator, and Fausse soils formed in the grayish Mississippi River alluvium. Dundee soils formed in loamy alluvium mainly along the high, natural levees of the Tensas/Black River System and the wide natural levee to the south of Little River. They are also in high positions on the undulating topography formed as point bars during the lateral migration of the Mississippi River and other minor distributaries and crevasses within the parish. Tensas soils are at intermediate elevations where clayey alluvium overlies loamy alluvium. Sharkey, Alligator, and Fausse soils formed in clayey alluvium and are at low elevations. Fausse soils remain wet and saturated throughout most years. The largest area of Fausse soils is near Shad Lake where the soils are capped by a thin layer of reddish alluvium deposited by the Red River. Several thousand acres of Sharkey clay overwash are between Larto Lake and the Red River. These soils have a thin veneer, 4 to 12 inches thick, of recent Red River alluvium on the surface.

An unusual geomorphic feature in the alluvial plains of Catahoula Parish is Little River. This stream carried water from Catahoula Lake to the Black River and from the Black River to Catahoula Lake before the construction of the Catahoula Lake Diversion Channel. The stream channel is a large crevasse that probably formed when the Mississippi River occupied the Tensas/Black River system. As the crevasse developed westward, numerous smaller crevasses overflowed to the south of the channel. This resulted in large areas of gently undulating, loamy soils in the western part of the parish, south of Little River.

The natural levee of the Little River is widest near Jonesville and gradually narrows as it extends westward, eventually disappearing at Catahoula Lake. This natural levee is only on the south side of Little River, and it is unusually wide for a stream of this size. When the crevasse formed, flood waters could only overflow to the south because a low terrace (Wallace Ridge) was immediately adjacent to the crevasse channel on the north side. At present, the elevations on both sides of Little River are about the same.

The *Ouachita/Arkansas River alluvium* was primarily deposited by the Arkansas River before it abandoned the present Ouachita River channel in favor of a new route to the Mississippi River. Other relict channels of the Arkansas River are clearly expressed in Catahoula Parish. These include Bushley Bayou, Haha Bayou, Big Slough, Mount Bayou, Saline Bayou, Old Saline Bayou, and others. Several oxbow lakes, such as Mean, Wallace, Tew, Big, Sandy, and Long Lakes, also mark routes of the relict Arkansas River. Boeuf River functions as a backswamp stream, flanking the Macon Ridge on its west side from a point in Caldwell Parish. These river channels are thought to have developed some time during the period from 3,100 years ago to the present *(10)*.

Elevations along the present Ouachita River range from about 40 to 60 feet above sea level. The Ouachita River has a much narrower natural levee than the natural levees of the Mississippi River system. The alluvial plain along the Ouachita River has local relief of about 15 feet. The Ouachita River occupies a channel cut to a depth of as much as 40 feet below the adjacent alluvium. Most of the soils in Catahoula Parish that formed in alluvium from the Ouachita/Arkansas River system are in a generally parallel band along the Ouachita River.

Other prominent deposits of the Arkansas River are about one mile south of Jonesville and along Big Slough, about four miles further south. These deposits are remnants of well developed natural levees along old channels of the Arkansas River. Recent Mississippi River alluvium completely surrounds these remnants and presumably buries parts of these and other former channels of the Arkansas River. Other evidence of the burial of Arkansas River sediment can be seen south of Jonesville along Saline Bayou where the original natural levee has been buried by about 6 feet of clayey Mississippi River alluvium. Still farther south, along Shoe Bayou, thinner veneers of Mississippi River sediment cover Arkansas sediment. In places along Powell cutoff, the loamy, reddish, Arkansas River alluvium is covered by about 12 inches of red clay more recently deposited by the Red River. Archeological excavations along Powell cutoff, near the Larto Lake channel, date the surface of the Arkansas sediment at 4,560 plus or minus

230 B.P. using carbon 14 dating technology (9). This surface lies beneath about 3 feet of clayey Mississippi River alluvium.

The area south of Larto Lake is very complex because three major river systems, the Arkansas, Mississippi, and the Red Rivers, have dominated the geological events in this area during the Holocene Epoch. In places, Arkansas River sediment is buried by Mississippi River or Red River sediment. Most commonly, sediments of the Arkansas, Mississippi, and Red Rivers are stacked upon one another. The Red River sediment is the youngest and is at the surface.

Sediment carried by the present channel of the Ouachita River is mostly grayish. Its source is primarily the coastal plain uplands of Louisiana and Arkansas. The sediment is being deposited in point bar positions along the Ouachita River. The gently undulating, occasionally flooded Hebert soils that formed in the sediment differ from the typical Hebert soils in that they are grayish rather than reddish.

In Catahoula Parish, the Sterlington, Rilla, and Hebert soils formed in Ouachita/Arkansas River alluvium. Rilla and Sterlington soils formed in loamy sediment on the high natural levees of the Ouachita River and other former channels and distributaries of the old Arkansas River. Some of the Sterlington soils are not reddish and presumably formed in Ouachita River sediment rather than Arkansas River sediment. Hebert soils are at slightly lower elevations than the Sterlington and Rilla soils, and they have a subsoil that is grayish in the upper part. This color indicates that the Hebert soils probably formed in an environment that was wetter than that of the Sterlington and Rilla soils. However, some pedologists believe the gray in the Hebert soil indicates that more recent grayish sediment from the present Ouachita River was deposited over the reddish, Arkansas River sediment.

Other soils that formed wholly or partly in alluvium from the Ouachita/Arkansas River System are Perry, Alligator, and Tensas soils. These soils are clayey and at low elevations. As in the case of the Hebert soils, some pedologists think that the gray, clayey material overlying the reddish clay in the Perry soils is the result of depositional differences rather than genetic factors. In areas near the Hebert and Rilla soils, the Alligator soils have reddish clay below a depth of 40 inches or more, and the Tensas soils have 20 to 36 inches of gray clay over reddish, loamy, Arkansas River sediment.

Recent *Red River alluvium* is probably the youngest soil material in Catahoula Parish. It is thought to be about 500 years old or younger. About 500 years ago the Red River changed its course from the older channels west of Marksville and cut through the Moncla Gap north of Marksville to flow eastward to join the Black River. Elevations on the alluvial plain of the Red River range from about 40 to 55 feet above sea level.

The Roxana, Norwood, and Moreland soils formed in Red River alluvium. Roxana soils are high in sand content and low in clay content. These soils are on the highest points of natural levees and on point bars along the Red River. Norwood soils contain more clay and silt and less sand than the Roxana soils, and they are at slightly lower elevations. The clayey Moreland soils are in the lowest backswamp areas. A thin veneer of clayey Red River alluvium is deposited on the surface of several thousand acres of Mississippi River alluvium.

The Old Red River forms the southwest boundary of Catahoula Parish. This very recently abandoned channel of the Red River is being rapidly filled with sediment during periods of high water in the Red River. The Red River flows eastward in an abandoned channel of the Mississippi River from a point about 2 miles east of the convergence of the Old Red River and Red River to its junction with the Black River, to form the southern boundary of the parish. Most of this part of the Red River has a narrow, poorly developed, natural levee. This is because of the relatively short period of time that the Red River has occupied this channel and because this deeply entrenched old Mississippi River channel is being filled with Red River sediment.

Local stream alluvium is derived from active geologic erosion of the nearby uplands of Catahoula and LaSalle Parishes. This local alluvium is in the narrow valleys of small streams that drain the uplands and in alluvial fans where these streams empty onto the alluvial plains.

Most of the alluvium carried by local streams was eroded from soils that are acid and highly weathered. Guyton soils formed in the redeposited sediment. Elevations on the flood plains of local streams range from about 50 feet above sea level in the area south of Manifest to about 120 feet above sea level in the valleys of some of the streams in the uplands.

Major streams that dissect the uplands of Catahoula Parish are Big, Brushly, Ford, Haggerty, Hawthorne, Hooter, Kennedy, Rawson, Rhinehart, and Sugar Creeks. Many other smaller creeks and drainageways contribute to the erosional and depositional processes ongoing in Catahoula Parish.

Loess

Loess completely covers about 5 percent of Catahoula Parish. This area includes all of Macon Ridge and a small area on the east side of Wallace Ridge, and it corresponds to the Calloway-Calhoun general soil map unit.

The eastern edge of Macon Ridge is an abrupt escarpment that is 10 to 30 feet above the adjacent alluvial plain. Elevations of the Macon Ridge range from about 65 to 75 feet above sea level. Relief ranges from 5 to 10 feet.

The eastern edge of the Wallace Ridge is an escarpment that is 5 to 10 feet above the adjoining

alluvial plain. Elevations of the Wallace Ridge range from about 55 to 65 feet above sea level. Relief is generally less than 5 feet.

The loess has a maximum thickness of about 12 to 15 feet on the eastern edge of the Macon Ridge and becomes progressively thinner to the west. It is 2 to 3 feet thick near the Catahoula-LaSalle Parish line. The loess is about 7 to 8 feet thick on the eastern edge of Wallace Ridge and also thins to the west.

Loess was evidently deposited over all of the uplands and stream terraces of Catahoula Parish. It has been eroded off of all but the most stable ridgetops in the uplands. This loess was buried by deposits of Recent Alluvium in the western part of Wallace Ridge. The loess was deposited about 20,000 to 25,000 years ago *(10)*, and it is much younger than the Pleistocene stream terraces (Macon Ridge and Wallace Ridge), which it overlies. In many places, topographic features of the former land surfaces, such as braided stream channels and erosional drainage features, are evident in the present land surface. The underlying soils have distinct soil horizons. This indicates that these soils were in place for a long period of time before they were buried by loess.

The characteristics, distribution, time of deposition, and source of loess in the lower Mississippi Valley have been the subject of a number of studies *(4, 6, 8, 10, 12, 17)*. The loess in an area about 40 miles east of Catahoula Parish is composed of about 66 percent quartz, 20 percent carbonates, 5 percent feldspars, 7 percent clay minerals, and 2 percent accessory heavy minerals *(12)*.

The source of the loess is thought to have been the alluvium on the flood plains of the Mississippi River. During dry periods, winds blowing across this braided stream alluvium eroded, transported, and deposited soil material as loess over adjacent areas. More than one interval of loess deposition has occurred in some areas, with different times of deposition proposed for them *(8, 17)*. The surficial loess in areas about 40 miles east of Catahoula Parish is Peoria loess *(12)*. The surficial loess in Catahoula Parish is thought to be about the same age. In most places, it is leached of carbonates. An older deposit of loess than Peoria loess is recognized by its redder color and more strongly developed soil structure. This loess is in deep road cuts and gravel pits in several places in the Sicily Island Hill area of Catahoula Parish.

Bursley, Calhoun, Calloway, Loring, Memphis, and Providence soils are in the loessial areas of Catahoula Parish. Calhoun, Calloway, Loring, and Memphis soils formed in deposits of loess thicker than 4 feet. Providence soils formed in about 2 to 3 feet of loess that overlies loamy early Pleistocene and Tertiary sediment. Bursley soils formed partly in loess that is sandwiched between the overlying, loamy recent alluvium and the underlying, late Pleistocene, loamy Arkansas River alluvium.

Sediment of Late Pleistocene Age or Younger

This unusual stratigraphic unit makes up about 4 percent of Catahoula Parish and corresponds to the Bursley-Calhoun general soil map unit. This stratigraphic unit is overlain by loess, Recent Alluvium, or both. This unit is on most of Wallace Ridge and in a small area in southwest Catahoula Parish west of Cypress, Mount, and Cross Bayous along the LaSalle Parish line. Elevations range from about 50 feet above sea level on the western part of Wallace Ridge near Long Lake to about 60 feet near Highway 124 on the eastern part of Wallace Ridge. Elevations in the area west of Mount Bayou in the southwest part of the parish are between 40 and 50 feet above sea level.

The sediment of late Pleistocene age, which forms the lower part of the subsoil of soils in this area, consists of glacial outwash or valley train deposits of the Arkansas River. The sediment is sandy and was deposited by swiftly flowing, sediment-choked distributaries of the Arkansas River at a time when the river was draining regions of active glaciation to the west and north. The sediment was deposited about 30,000 to 40,000 years ago *(10)*.

The loess that overlies most of the soils in these areas is about 2 to 4 feet thick. It is thought to have been deposited about 20,000 to 25,000 years ago.

The recent alluvium that overlies most of the soils in this area is thought to have originated from Bushley Bayou, a large crevasse or relict channel of the Ouachita/Arkansas River complex. It is believed that sediment-laden waters overflowed the natural levees and deposited a thin veneer of alluvium over the loess. This recent alluvium is about 10 to 18 inches thick. Recent alluvium from the Little River is thought to have been deposited over the loess in southwest Catahoula Parish along the LaSalle Parish line.

Bursley, Calhoun, Forestdale, and Necessity soils are in these areas. Bursley soils formed in loess that is sandwiched between the overlying, loamy recent alluvium and the underlying late Pleistocene loamy sediment. Calhoun soils formed in loess or mixed silty sediment and loess. Forestdale soils formed where Pleistocene silty alluvium was covered with Recent clayey alluvium. Necessity soils formed in silty Pleistocene sediment mixed with loess. Included with the Bursley and Calhoun soils are a few small areas of soils similar to these soils except that they have an alkaline subsoil and contain high levels of exchangeable sodium.

Sediment of Early Pleistocene and Tertiary Age

The sediment of early Pleistocene and Tertiary age are exposed in many places on the uplands of Catahoula Parish. These uplands, which make up about 22 percent of the parish, are characterized by steep side slopes, narrow valleys, and narrow ridgetops. Maximum relief is about 300 feet. The hydraulic gradients of streams that

drain the uplands typically range from 30 to 40 feet per mile. Gradients of 300 feet per mile or more occur over short distances within some drainage areas. These steep hydraulic gradients and short distances from drain heads to the base levels resulted in rapid erosion and created a deeply dissected landscape.

The exposed geological formations on uplands of Catahoula Parish, from north to south, include the Jackson Group (Eocene), Vicksburg Group (Oligocene), Catahoula Formation (Miocene), and the Citronelle Formation (Pleistocene). The Jackson, Vicksburg, and Catahoula Formations dip southward to the Gulf of Mexico and are eventually buried by younger Pleistocene and more recent sediment. In Catahoula Parish, the Citronelle Formation once covered all of these formations, but much of this sediment has eroded from the present landscape. Loess also blanketed the area and has eroded from all but the most stable ridgetops.

The Jackson Group is the most fossiliferous of the geological formations in Louisiana. It outcrops along the Ouachita River in both Caldwell and Catahoula Parishes. The Jackson Group is generally yellow, yellow-brown, or gray, sticky, acid clay that has, in places, calcareous nodules and fossils of various species of marine life. Very little, if any, sand is associated with the Jackson Group in Catahoula Parish. The Jackson Group is about 450 feet thick in well borings taken in northern Catahoula Parish *(3)*. Bayoudan soils formed in material of the Jackson Group.

The Vicksburg Group overlies the Jackson Group. It is similar to the Jackson Group and is mainly grayish and brownish clay interbedded with strata of glauconitic sand. The contact between the Jackson and Vicksburg Groups is not a distinct lithologic break, although the Jackson is much more clayey and forms a sticky-yellow subsoil, whereas the Vicksburg contains an appreciable amount of sand and produces a reddish brown and somewhat sandy subsoil *(3)*. This correlates with the soils and exposures of the Jackson and Vicksburg Groups as observed during mapping.

An outcrop of the Vicksburg Group is in a road cut (NE1/4SW1/4, sec. 35, T. 11 N., R. 5 E.). It consists of alternating strata of grayish and brownish clays, grayish sands, and limonite. Another small outcrop of the Vicksburg Group consists of yellowish, calcareous clays containing carbonate concretions and fossils of several marine species, including shark teeth.

According to geology reports, the thickness of the Vicksburg Group in Catahoula Parish varies considerably. Well log data indicate thicknesses of from 100 to possibly 300 feet; although there were problems in the positive differentiation of the Vicksburg Group from the Jackson. Reports also describe an hiatus at the base of the Vicksburg Group in which some members of the group that occur in the state of Mississippi are missing in Catahoula Parish *(3)*.

The upper part of the Vicksburg Group is unconformably overlain by the Cassel Hill Member of the Catahoula Formation. The Catahoula Formation was first identified by William Dunbar in a report to President Jefferson in 1806 *(5)*. Since that time numerous authors have referred to the Catahoula Formation by many different names in different localities from Texas to Alabama.

The Catahoula Formation attains a maximum thickness of about 350 feet in northwest Catahoula Parish. It is subdivided into the lower Cassel Hill Member, the Chalk Hill Member, and the upper undifferentiated Catahoula.

The Cassel Hill Member is loose, grayish, crossbedded, fine to medium grained sand that has occasional thin strata of clay. It reaches a maximum thickness of 45 feet. The Chalk Hill Member is a bed of white to cream shards of volcanic ash that reaches a maximum thickness of about 8 feet. The undifferentiated Catahoula is the most prominent member of the formation. It is alternating layers of olive to light gray clay and white to gray sandstone. Thickness of the individual layers ranges from a few inches to several feet *(3)*.

The gravelly Citronelle Formation lies unconformably on the eroded Catahoula surface. The contact can be seen in numerous road cuts throughout the hilly uplands. The formation is reddish sands, clays, and gravels that reach a maximum thickness of about 40 feet in Catahoula Parish. Gravels are generally less than 1 inch in diameter but range to 6 inches. This formation is thought to have been deposited when conditions of heavy rainfall and melting glaciers in the north fed the Mississippi River with large amounts of torrential water that carried the sediment southward.

The uplands of Catahoula Parish can be physiographically divided into four general areas—the Bayou Dan Hills, the Chalk Hills, the Sand Hills on the west side of the Ouachita River, and the Sicily Island Hills on the east side of the Ouachita River.

The Bayou Dan Hills are generally along the Catahoula-Caldwell Parish boundary and extend northward into Caldwell Parish. They are drained by the South Fork of Bayou Dan that flows into the Ouachita River. These hills are formed in the very sticky clays of the Jackson Group.

Alligator soils are on flood plains of streams that drain the Bayou Dan Hills. The parent material consists of a mixture of alluvium deposited by the Ouachita River and local streams. Bayoudan soils are on ridgetops and side slopes and formed in clayey sediment of the Jackson Formation. Content of expandable clays in these soils is 80 percent or more. Landslides are common in this area. Homes, pipelines, and highways have been destroyed or severely damaged by these landslides.

The largest area of the Vicksburg Group outcrops is south of the Bayou Dan Hills and north of the Chalk Hills. This hilly and highly dissected area is drained primarily by Hooter Creek and the upper reaches of

Haggerty Creek. The outcrops of the Vicksburg Group are similar to those of the Jackson Group except that they contain more sand. This higher sand content differentiates this sediment from that of the Bayou Dan Hills.

Capping the tops of most of the hills in this area south of the Bayou Dan Hills are outcrops of early Pleistocene sediment. Catahoula sandstone also outcrops on some ridgetops. The sandstone is all that is left of the Catahoula Formation. A thin veneer of loess is on the more stable ridgetops.

Sweatman soils formed in the highly stratified sands and clays of the Vicksburg Group and comprise the majority of the soils in the hilly area south of the Bayou Dan Hills. Smithdale soils are primarily on major ridgetops and formed in Pleistocene sediment. The Alaga, Guyton, Kisatchie, Lucy, Oula, and Providence soils are also in this area.

Another part of the area south of the Bayou Dan Hills tapers southwest to Haggerty Creek from Catahoula Church and eastward to the Ouachita River alluvial plain. This area is composed primarily of deep sands. These sands are 10 to 45 feet thick and can be correlated geologically with the Cassel Hill Member of the Catahoula Formation *(3)*. A road exposure, 45 feet thick, is described as fine to medium grained, loose, gray sand that is cross-bedded with occasional shale partings.

In the eastern part of the area described, numerous gray sandstone rocks from the undifferentiated member of the Catahoula Formation are exposed on the surface. Alaga soils formed in these areas of thick sands. The clay content is less than 5 percent, and fine and medium sand make up the rest of the material. Smithdale and Lucy soils formed in areas where Pleistocene sediment was not eroded away. Guyton, Oula, Providence, and Sweatman soils are also in this area.

The Chalk Hills are generally in an area 2 to 4 miles south of Rosefield and eastward on the south side of Sugar and Kennedy Creeks. These hills derive their name from the chalky appearance of the fine, white volcanic ash of this member of the Catahoula Formation. Although no chalk or calcareous material is found in the area, the term "chalk" has been used very often previously, and its usage cannot be avoided. This fine, white volcanic material drifted some 300 miles eastward from volcanic vents and was deposited in a lake. The deposit is relatively pure and about 8 feet thick in the area near Bald Hill, and it thins both eastward and westward *(3)*.

The Chalk Hills, and possibly the Sicily Island Hills, are the eastward most extensions of the Kisatchie Wold. Kisatchie Wold is the prominent topographic feature produced by the hard sandstone layers of the Catahoula Formation *(16)*. These sandstone layers are probably the most erosion resistant material in Louisiana and are responsible for several geomorphic structures in the state. These structures include not only the Kisatchie Wold but also the rapids which once existed in the Red River near Alexandria and in the Ouachita River near Harrisonburg. The erosion resistance of the Catahoula Formation is responsible for the narrowest gap in the Mississippi River Valley. This gap is the point from the Sicily Island Hills eastward to the uplands in the state of Mississippi.

The Chalk Hills area is geologically composed of sands from early Pleistocene sediment and clays from the undifferentiated member of the Catahoula Formation. This area is very hilly. It is dissected by many small streams that drain mostly northward into Sugar and Kennedy Creeks, and then to the Ouachita River alluvial plain. A thin deposit of loess, 2 to 4 feet thick, is also on the higher and more stable ridgetops in this area.

In the Chalk Hills area, Smithdale soils formed in the reddish Pleistocene sediment. Oula soils formed in the gray, tuffaceous clays of the undifferentiated member of the Catahoula Formation. Providence soils formed in the loess and the underlying Tertiary material. Guyton, Kisatchie, Loring, and Lucy soils are also in this area.

All of the remaining uplands, to the south of the areas previously described and west of the Ouachita River, are referred to as the Sand Hills. The Sand Hills area is composed of outcrops of the undifferentiated member of the Catahoula Formation and the sands and gravels of the Citronelle Formation. The deposits of the Citronelle Formation are thickest in the southern part of the Sand Hills area. Loess, 2 to 4 feet thick, is on the more stable ridgetops throughout this area.

The Sand Hills area west of the Ouachita River and extending northward from Callahan Branch is very hilly and deeply dissected by drainageways. Rawson Creek and Callahan Branch drain this area eastward into the Ouachita River. Local relief is about 100 feet. In this Sand Hills area, Oula soils formed in the tuffaceous, clayey material of the Catahoula Formation. Providence soils formed in loess, 2 to 4 feet thick, and the underlying Tertiary material. Smithdale soils formed in the sandy and sometimes gravelly early Pleistocene Citronelle Formation. Slope ranges from 5 to 40 percent throughout the area. Guyton, Kisatchie, Loring, and Lucy soils are also in this area.

The Sand Hills area near the Village of Aimwell and extending northward to the Chalk Hills is not so steep nor deeply dissected as most other parts of the Sand Hills. Rawson Creek drains the eastern third of the area. Brushy and Ford Creeks drain the remainder of the area. In this Sand Hills area, Providence soils are mainly on ridgetops, and Oula soils are on side slopes. Slope ranges from 5 to 25 percent. Guyton, Kisatchie, Loring, Lucy, and Smithdale soils are also in this area.

The Sand Hills area near the Village of Prichard and extending south to the flood plains is very hilly and deeply dissected by many small drainageways. It is drained by many small creeks that flow north to Callahan Branch and Rawson Creek and by creeks that drain

southward to the alluvial plain of the Ouachita River. In this Sand Hills area, Smithdale and Oula soils are on side slopes, and Providence soils are on narrow ridgetops. Slope ranges from about 5 to 40 percent. Oula soils formed in the tuffaceous, clayey strata of the undifferentiated Catahoula Formation. They do not contain sandstone rock as is common to other soils formed in the Catahoula Formation. Smithdale soils formed in sandy and sometimes gravelly material of the Citronelle Formation. Providence soils formed in loess and the underlying loamy material of the Citronelle Formation. Guyton, Kisatchie, Loring, and Lucy soils are also in this area.

The Sand Hills area south of Aimwell and extending southward to Manifest and Rhinehart is also hilly and dissected by small drainageways. However, this area is not so severely dissected and steep as most other areas in the Sand Hills. The area north of Manifest is drained to the south by the many small creeks that combine to form Ford and Bushley Creeks. To the south of Manifest, many small creeks and streams drain from the uplands eastward to the Ouachita River alluvial plain.

This Sand Hills area is composed of thicker sediment of the Citronelle Formation because of the southward dip of the Catahoula Formation. This results in few exposures of the Catahoula Formation in this area. There are several open pits in this area that produce gravel and a building material locally called "pit run."

Smithdale, Lucy, and Providence soils are in this area. Slope ranges from 5 to 25 percent. Smithdale and Lucy soils formed in sandy and often gravelly material of the Citronelle Formation. Providence soils formed in loess and the underlying loamy Citronelle Formation. Guyton, Kisatchie, Loring, and Oula soils are also in this area.

The Sicily Island Hills area is circular and is about 19 square miles. Contrary to what is indicated on some current topographic maps, this entire area is very hilly, steep, and deeply dissected. Maximum elevation is about 250 feet above sea level. This area is surrounded by alluvial plains and Pleistocene terraces that have elevations ranging from about 55 to 70 feet above sea level. The circular shape and prominence as compared to the surrounding landscape are the reasons this area is referred to as an island.

This unusual landform was probably formed when a former stream, positioned in the present Ouachita River valley, formed a gap completely through the hills through the process of headward erosion. A very similar type gap can be seen at the intersection of Catahoula Church Road and Highway 124, SW1/4SE1/4 sec. 25, T. 11 N., R. 5 E. The Arkansas River, at some later time during a period of high water, overflowed into this gap and quickly eroded a more defined passageway for the river through the gap. Through the stream meandering processes, this gap has been further widened to its present width of about 8,800 feet.

Geologically, the entire Sicily Island Hills are composed of basal strata of the undifferentiated Catahoula Formation overlain by deposits of the Citronelle Formation. Capping the ridgetops and, in a few places, the entire side slopes is loess.

Loess in the Sicily Island Hills reaches thicknesses of 25 to 30 feet in places. Geologists believe it is deposits from two time periods. The lower deposits of loess is 8 to 10 feet thick and has a paleosol that has a soil profile about 3 to 4 feet thick. This profile is redder and has more strongly developed structure than the soils formed in the overlying loess. This loess is probably the same deposition of loess recognized in Evangeline Parish *(4)* and possibly the same as that occurring on the Bastrop Ridge in Morehouse Parish.

The upper deposits of loess is 10 to 15 feet thick. Memphis soil formed in this younger loess. Accurate representative measurements of the thickness of the two loess deposits was not considered possible because of the irregular surface of the underlying Citronelle Formation. Both the upper and lower deposits of loess are essentially leached of carbonates. However, calcium carbonate concretions are in the loess in several road cuts in the Sicily Island Hills. These areas are also used by cattle as mineral licks.

The Sicily Island Hills are drained almost entirely by Big Creek, which flows southwest through the center of the hills into the Ouachita River. A few small creeks and drainageways drain the outer perimeters of the island onto the Ouachita alluvial plain and the Macon Ridge.

Memphis, Kisatchie, Oula, and Smithdale soils are in the Sicily Island Hills. Memphis soils formed in the loess on ridgetops and upper side slopes. Kisatchie soils formed in the clayey Catahoula Formation on side slopes where sandstone rock was at a depth of 20 to 40 inches. Oula soils also formed in the clayey Catahoula Formation on side slopes in areas where rock strata were absent. Smithdale soils formed in sandy and gravelly deposits of the early Pleistocene Citronelle Formation. Guyton and Lucy soils are also in this area.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluviál, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A

fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as

well as the amount of soil and rock material, vary greatly.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). There is a shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). The soil mass is susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.
Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.
Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."
Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.
Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.
Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.
Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."
Thin layer (in tables). Otherwise suitable soil material is too thin for the specified use.
Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.
Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.
Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.
Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1952-79 at Belah Fire Tower, Louisiana]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	56.6	35.7	46.2	80	13	81	4.90	2.43	7.04	8	.5
February---	61.5	38.5	50.0	81	18	131	5.05	2.83	7.01	7	.6
March------	69.3	45.8	57.6	86	24	274	5.70	2.82	8.19	7	.2
April------	78.2	55.4	66.8	89	35	504	5.48	2.05	8.34	6	.0
May--------	84.3	61.9	73.1	95	45	716	5.96	2.95	8.56	7	.0
June-------	90.8	67.9	79.4	99	54	882	3.51	1.30	5.35	6	.0
July-------	93.4	70.8	82.1	102	62	995	5.30	3.02	7.32	8	.0
August-----	93.1	69.5	81.3	101	58	970	4.18	1.91	6.13	7	.0
September--	88.8	65.4	77.1	98	48	813	4.18	1.47	6.42	6	.0
October----	80.2	53.7	67.0	95	34	527	3.46	.96	5.51	4	.0
November---	68.8	44.7	56.8	86	23	229	4.50	1.93	6.68	6	.0
December---	60.6	38.3	49.5	80	17	100	6.17	3.59	8.47	8	.0
Yearly:											
Average--	77.1	54.0	65.6	---	---	---	---	---	---	---	---
Extreme--	---	---	---	103	13	---	---	---	---	---	---
Total----	---	---	---	---	---	6,222	58.39	47.65	68.62	80	1.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 °F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1952-79 at Belah Fire Tower, Louisiana]

Probability	Temperature: 24 °F or lower	Temperature: 28 °F or lower	Temperature: 32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 13	March 22	March 29
2 years in 10 later than--	March 2	March 14	March 23
5 years in 10 later than--	February 10	February 28	March 13
First freezing temperature in fall:			
1 year in 10 earlier than--	November 15	November 4	October 26
2 years in 10 earlier than--	November 24	November 11	October 31
5 years in 10 earlier than--	December 11	November 25	November 9

TABLE 3.--GROWING SEASON

[Recorded in the period 1952-79 at Belah Fire Tower, Louisiana]

Probability	Daily minimum temperature during growing season: Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	271	239	217
8 years in 10	282	249	225
5 years in 10	303	269	241
2 years in 10	324	289	256
1 year in 10	335	300	264

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES

Map unit	Percent of area	Cultivated farm crops	Pastureland	Woodland	Urban uses
Sharkey	10.0	Somewhat poorly suited: floods, wetness, poor tilth.	Somewhat poorly suited: floods, wetness.	Moderately well suited: floods, wetness.	Poorly suited: floods, wetness, shrink-swell, very slow permeability, low strength for roads.
Alligator-Perry	15.0	Somewhat poorly suited: floods, wetness, poor tilth.	Somewhat poorly suited: floods, wetness.	Moderately well suited: floods, wetness.	Poorly suited: floods, wetness, shrink-swell, very slow permeability, low strength for roads.
Tensas-Alligator	4.5	Somewhat poorly suited: floods, wetness, poor tilth.	Somewhat poorly suited: floods, wetness.	Moderately well suited: floods, wetness.	Poorly suited: floods, wetness, shrink-swell, very slow permeability, low strength for roads.
Guyton	5.0	Poorly suited: floods, wetness, low fertility, potential aluminum toxicity in root zone.	Somewhat poorly suited: floods, wetness.	Moderately well suited: floods, wetness.	Poorly suited: floods, wetness, low strength for roads.
Sharkey-Tensas	16.0	Moderately well suited: wetness, poor tilth.	Moderately well suited: wetness.	Well suited	Poorly suited: floods, wetness, shrink-swell, very slow permeability, low strength for roads.
Tensas-Alligator-Dundee	8.0	Moderately well suited: wetness, poor tilth.	Well suited	Well suited	Poorly suited: floods, wetness, shrink-swell, moderately slow and very slow permeability, low strength for roads.
Norwood-Roxana	1.5	Well suited	Well suited	Well suited	Poorly suited: floods, moderate permeability, low strength for roads.
Dundee	7.0	Well suited	Well suited	Well suited	Poorly suited: floods, wetness, shrink-swell, moderately slow permeability, low strength for roads.

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES--Continued

Map unit	Percent of area	Cultivated farm crops	Pastureland	Woodland	Urban uses
Hebert-Perry	7.0	Well suited	Well suited	Well suited	Poorly suited: floods, wetness, shrink-swell, moderately slow and very slow permeability, low strength for roads.
Calloway-Calhoun-Memphis	5.0	Moderately well suited: wetness, slope, medium fertility, potential aluminum toxicity in root zone.	Well suited	Well suited	Poorly suited: floods, wetness, slope, low strength for roads.
Bursley-Calhoun	4.0	Moderately well suited: wetness, medium fertility, potential aluminum toxicity in root zone.	Well suited	Moderately well suited: wetness.	Poorly suited: floods, wetness, moderately slow and slow permeability, low strength for roads.
Providence-Oula-Smithdale	6.0	Poorly suited: slope, low and medium fertility, potential aluminum toxicity in root zone.	Poorly suited: slope.	Moderately well suited: slope.	Poorly suited: slope, wetness, shrink-swell, moderate to very slow permeability, low strength for roads.
Smithdale-Oula-Sweatman	8.0	Poorly suited: slope, low and medium fertility, potential aluminum toxicity in root zone.	Poorly suited: slope.	Moderately well suited: slope.	Poorly suited: slope, shrink-swell, moderate to very slow permeability, low strength for roads.
Memphis-Smithdale	3.0	Poorly suited: slope, medium and low fertlity, potential aluminum toxicity in root zone.	Poorly suited: slope.	Moderately well suited: slope.	Poorly suited: slope, low strength for roads.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AA	Alaga-Smithdale-Lucy association, 5 to 40 percent slopes	3,164	0.7
Ag	Alligator clay, occasionally flooded	33,118	6.9
At	Alligator clay, frequently flooded	22,085	4.6
Ba	Bayoudan clay, 5 to 40 percent slopes	2,868	0.6
Br	Bursley silt loam, rarely flooded	4,185	0.8
Bs	Bursley silty clay loam, rarely flooded	7,376	1.5
Co	Calhoun silt loam	5,099	1.1
Cs	Calhoun silt loam, rarely flooded	5,041	1.0
Cw	Calloway silt loam	8,925	1.9
Cy	Calloway silt loam, rarely flooded	1,822	0.4
De	Dundee silt loam, 0 to 1 percent slopes	12,842	2.7
Dh	Dundee silt loam, gently undulating	7,113	1.5
Dn	Dundee silty clay loam, 0 to 1 percent slopes	11,798	2.5
Ds	Dundee-Alligator complex, gently undulating	12,066	2.5
Fa	Fausse clay	5,512	1.1
Fd	Forestdale silty clay loam	1,329	0.3
Fo	Forestdale silty clay loam, occasionally flooded	2,439	0.5
Gt	Guyton silt loam	6,733	1.5
Gy	Guyton silt loam, frequently flooded	17,539	3.6
Hb	Hebert silt loam	11,732	2.4
He	Hebert silty clay loam	7,394	1.5
Hh	Hebert silt loam, undulating, occasionally flooded	3,724	0.8
Lo	Loring silt loam	1,276	0.3
Lr	Loring silt loam, rarely flooded	240	*
Me	Memphis silt loam, 0 to 2 percent slopes	2,135	0.4
Mh	Memphis silt loam, 2 to 5 percent slopes	644	0.1
Mm	Memphis silt loam, 5 to 12 percent slopes	1,038	0.2
MP	Memphis-Kisatchie-Oula association, 5 to 40 percent slopes	2,979	0.6
MS	Memphis-Smithdale association, 5 to 40 percent slopes	8,741	1.8
Mt	Moreland clay	1,936	0.4
Ne	Necessity silt loam, rarely flooded	694	0.1
No	Norwood silt loam	3,959	0.8
OA	Oula-Providence-Smithdale association, 5 to 40 percent slopes	8,781	1.8
OP	Oula-Providence association, 5 to 25 percent slopes	12,815	2.7
Pa	Perry silty clay loam	6,222	1.3
Pd	Perry clay, occasionally flooded	10,420	2.2
Pe	Perry clay, frequently flooded	372	0.1
Pg	Pits, gravel	1,026	0.2
Pr	Providence silt loam, 1 to 6 percent slopes	3,922	0.8
Ra	Rilla silt loam	1,030	0.2
Rn	Roxana very fine sandy loam	1,467	0.3
Rp	Roxana very fine sandy loam, frequently flooded	413	0.1
Sh	Sharkey clay	50,129	10.4
Sk	Sharkey clay, occasionally flooded	29,235	6.1
Sm	Sharkey clay, frequently flooded	8,483	1.8
Sn	Sharkey clay, overwash	6,978	1.5
SP	Smithdale-Oula-Providence association, 5 to 40 percent slopes	16,471	3.4
SR	Smithdale-Lucy-Providence association, 5 to 25 percent slopes	13,888	2.9
Ss	Sostien clay, occasionally flooded	1,858	0.4
St	Sterlington silt loam	2,755	0.6
SW	Sweatman-Smithdale association, 5 to 40 percent slopes	9,964	2.1
Ta	Tensas silty clay	12,819	2.7
Te	Tensas silty clay, occasionally flooded	4,169	0.9
Tn	Tensas-Alligator complex, undulating	22,592	4.7
Ts	Tensas-Alligator complex, undulating, occasionally flooded	16,456	3.4
UD	Udifluvents, loamy	1,188	0.2
	Small water areas	2,241	0.5
	Large water areas	17,314	3.6
	Total	480,554	100.0

* Less than 0.1 percent.

TABLE 6.--PRIME FARMLAND

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland]

Map symbol	Soil name
Br	Bursley silt loam, rarely flooded
Bs	Bursley silty clay loam, rarely flooded
Co	Calhoun silt loam
Cs	Calhoun silt loam, rarely flooded
Cw	Calloway silt loam
Cy	Calloway silt loam, rarely flooded
De	Dundee silt loam, 0 to 1 percent slopes
Dh	Dundee silt loam, gently undulating
Dn	Dundee silty clay loam, 0 to 1 percent slopes
Ds	Dundee-Alligator complex, gently undulating
Fd	Forestdale silty clay loam
Gt	Guyton silt loam
Hb	Hebert silt loam
He	Hebert silty clay loam
Lo	Loring silt loam
Lr	Loring silt loam, rarely flooded
Me	Memphis silt loam, 0 to 2 percent slopes
Mh	Memphis silt loam, 2 to 5 percent slopes
Mt	Moreland clay
Ne	Necessity silt loam, rarely flooded
No	Norwood silt loam
Pa	Perry silty clay loam
Pr	Providence silt loam, 1 to 6 percent slopes
Ra	Rilla silt loam
Rn	Roxana very fine sandy loam
Sh	Sharkey clay
Sn	Sharkey clay, overwash
St	Sterlington silt loam
Ta	Tensas silty clay

TABLE 7.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Soybeans	Cotton lint	Rice	Grain sorghum	Wheat	Bahiagrass	Common bermuda-grass
		Bu	Lbs	Bu	Bu	Bu	AUM*	AUM*
AA:								
Alaga	VIIs	---	---	---	---	---	---	---
Smithdale	VIIe	---	---	---	---	---	---	---
Lucy	VIs	---	---	---	---	---	---	---
Ag Alligator	IVw	25	---	100	55	---	---	4.5
At Alligator	Vw	15	---	---	35	---	---	4.0
Ba Bayoudan	VIIe	---	---	---	---	---	---	3.5
Br, Bs Bursley	IIIw	25	550	---	80	40	6.0	5.5
Co, Cs Calhoun	IIIw	25	500	100	65	35	6.0	4.5
Cw, Cy Calloway	IIw	33	650	100	80	40	7.0	5.0
De Dundee	IIw	40	750	---	95	45	8.0	8.0
Dh Dundee	IIw	35	700	---	90	40	8.0	8.0
Dn Dundee	IIw	37	725	110	90	40	8.0	8.0
Ds Dundee-Alligator	IIIw	35	668	---	85	35	7.0	7.5
Fa Fausse	VIIw	---	---	---	---	---	---	---
Fd Forestdale	IIIw	33	600	100	65	35	---	5.5
Fo Forestdale	IVw	30	---	100	55	---	---	5.0
Gt Guyton	IIIw	23	500	100	65	30	7.0	6.0
Gy Guyton	Vw	15	---	---	30	---	---	5.0

See footnote at end of table.

TABLE 7.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Soybeans	Cotton lint	Rice	Grain sorghum	Wheat	Bahiagrass	Common bermuda-grass
		Bu	Lbs	Bu	Bu	Bu	AUM*	AUM*
Hb-------------- Hebert	IIw	35	725	---	90	35	7.0	8.0
He-------------- Hebert	IIw	33	700	100	80	30	6.5	8.0
Hh-------------- Hebert	IIIw	32	700	---	70	20	6.0	8.0
Lo, Lr---------- Loring	IIw	33	750	---	85	40	10.0	8.0
Me-------------- Memphis	I	35	800	---	90	50	10.0	8.0
Mh-------------- Memphis	IIe	33	750	---	80	45	9.5	7.5
Mm-------------- Memphis	IVe	---	---	---	70	35	8.0	6.0
MP:								
Memphis--------	VIe	---	---	---	---	---	---	---
Kisatchie------	VIe	---	---	---	---	---	---	---
Oula-----------	VIIe	---	---	---	---	---	---	---
MS:								
Memphis--------	VIe	---	---	---	---	---	---	6.0
Smithdale------	VIIe	---	---	---	---	---	---	---
Mt-------------- Moreland	IIIw	37	625	110	80	25	---	---
Ne-------------- Necessity	IIw	33	625	---	85	35	7.5	6.0
No-------------- Norwood	I	40	875	---	100	45	9.5	8.5
OA:								
Oula-----------	VIIe	---	---	---	---	---	---	---
Providence-----	VIe	---	---	---	---	---	8.0	---
Smithdale------	VIIe	---	---	---	---	---	---	---
OP:								
Oula-----------	VIe	---	---	---	---	---	5.5	4.0
Providence-----	VIe	---	---	---	---	---	8.0	5.0
Pa-------------- Perry	IIIw	35	475	110	75	30	7.0	6.5

See footnote at end of table.

TABLE 7.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Soybeans	Cotton lint	Rice	Grain sorghum	Wheat	Bahiagrass	Common bermuda-grass
		Bu	Lbs	Bu	Bu	Bu	AUM*	AUM*
Pd-------------- Perry	IVw	30	---	100	55	---	---	6.0
Pe-------------- Perry	Vw	20	---	---	40	---	---	5.0
Pg. Pits								
Pr-------------- Providence	IIIe	35	750	---	75	40	8.5	6.0
Ra-------------- Rilla	I	40	800	---	95	45	8.5	7.5
Rn-------------- Roxana	I	35	850	---	95	45	9.5	8.5
Rp-------------- Roxana	Vw	---	---	---	---	---	---	6.0
Sh-------------- Sharkey	IIIw	40	650	110	90	40	---	6.5
Sk-------------- Sharkey	IVw	30	---	110	70	---	---	4.5
Sm-------------- Sharkey	Vw	20	---	---	50	---	---	4.2
Sn-------------- Sharkey	IIIw	40	650	110	90	40	---	6.5
SP:								
Smithdale------	VIIe	---	---	---	---	---	---	---
Oula-----------	VIIe	---	---	---	---	---	---	---
Providence-----	VIe	---	---	---	---	---	---	6.0
SR:								
Smithdale------	VIIe	---	---	---	---	---	---	---
Lucy-----------	VIs	---	---	---	---	---	---	---
Providence-----	VIe	---	---	---	---	---	8.0	6.0
Ss-------------- Sostien	IVw	---	---	---	---	---	---	6.0
St-------------- Sterlington	I	30	775	---	100	45	11.5	7.0
SW:								
Sweatman-------	VIIe	---	---	---	---	---	---	---
Smithdale------	VIIe	---	---	---	---	---	---	---
Ta-------------- Tensas	IIIw	35	650	100	95	40	---	6.5

See footnote at end of table.

TABLE 7.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Soybeans	Cotton lint	Rice	Grain sorghum	Wheat	Bahiagrass	Common bermuda-grass
		Bu	Lbs	Bu	Bu	Bu	AUM*	AUM*
Te---------------- Tensas	IVw	30	---	100	90	---	---	6.0
Tn---------------- Tensas-Alligator	IIIw	33	600	---	90	30	---	6.0
Ts---------------- Tensas-Alligator	IVw	29	---	---	55	---	---	6.0
UD. Udifluvents								

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
AA:							
Alaga	3s	Moderate	Moderate	Moderate	Loblolly pine Longleaf pine	80 70	Loblolly pine.
Smithdale	2r	Moderate	Moderate	Slight	Shortleaf pine Loblolly pine Longleaf pine	69 86 69	Loblolly pine.
Lucy	3s	Moderate	Moderate	Moderate	Longleaf pine Loblolly pine	71 84	Loblolly pine.
Ag Alligator	2w	Slight	Severe	Moderate	Nuttall oak Green ash Water oak Overcup oak	--- 80 90 ---	Eastern cottonwood, green ash, sweetgum, American sycamore.
At Alligator	3w	Slight	Severe	Severe	Green ash Nuttall oak Overcup oak	70 --- ---	Eastern cottonwood, green ash, sweetgum, American sycamore.
Ba Bayoudan	4c	Moderate	Moderate	Slight	Shortleaf pine Loblolly pine	70 80	Loblolly pine.
Br, Bs Bursley	3w	Slight	Moderate	Slight	Sweetgum Water oak Willow oak Nuttall oak Swamp chestnut oak Elm	85 80 80 --- --- ---	Sweetgum, water oak, loblolly pine, American sycamore.
Co, Cs Calhoun	2w	Slight	Severe	Moderate	Cherrybark oak Water oak Sweetgum Loblolly pine	--- --- --- 90	Loblolly pine.
Cw, Cy Calloway	3w	Slight	Moderate	Slight	Cherrybark oak Loblolly pine Shortleaf pine Sweetgum Water oak	80 80 70 80 80	Loblolly pine, sweetgum.
De, Dh, Dn Dundee	2w	Slight	Moderate	Slight	Cherrybark oak Eastern cottonwood Sweetgum Water oak	105 100 100 95	Cherrybark oak, eastern cottonwood, sweetgum, water oak, yellow-poplar.
Ds:							
Dundee	2w	Slight	Moderate	Slight	Cherrybark oak Eastern cottonwood Sweetgum Water oak	105 100 100 95	Cherrybark oak, eastern cottonwood, sweetgum, water oak, yellow-poplar.
Alligator	2w	Slight	Severe	Moderate	Eastern cottonwood Green ash Water oak Sweetgum	95 80 90 90	Eastern cottonwood, green ash, sweetgum, American sycamore.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
Fa------------------ Fausse	4w	Slight	Severe	Severe	Baldcypress----------	---	Baldcypress.
					Water hickory--------	---	
					Water tupelo---------	---	
					Overcup oak----------	---	
					Black willow---------	---	
					Red maple------------	---	
Fd, Fo-------------- Forestdale	1w	Slight	Severe	Moderate	Green ash------------	78	Green ash, eastern cottonwood, Nuttall oak, sweetgum, American sycamore.
					Eastern cottonwood---	100	
					Cherrybark oak-------	94	
					Nuttall oak----------	99	
					Water oak------------	90	
					Willow oak-----------	94	
					Sweetgum-------------	100	
Gt, Gy-------------- Guyton	2w	Slight	Severe	Moderate	Loblolly pine--------	90	Loblolly pine, sweetgum.
					Slash pine-----------	90	
					Sweetgum-------------	---	
					Green ash------------	---	
					Southern red oak-----	---	
					Water oak------------	---	
Hb, He, Hh---------- Hebert	2w	Slight	Moderate	Slight	Green ash------------	---	Eastern cottonwood, American sycamore.
					Eastern cottonwood---	95	
					Cherrybark oak-------	95	
					Nuttall oak----------	90	
					Sweetgum-------------	90	
					Pecan----------------	---	
					Water oak------------	90	
					American sycamore----	---	
Lo, Lr-------------- Loring	2o	Slight	Slight	Slight	Cherrybark oak-------	86	Loblolly pine, shortleaf pine, cherrybark oak, sweetgum, yellow-poplar.
					Loblolly pine--------	95	
					Shortleaf pine-------	90	
					Sweetgum-------------	90	
					Water oak------------	90	
Me, Mh, Mm---------- Memphis	1o	Slight	Slight	Slight	Cherrybark oak-------	90	Cherrybark oak, loblolly pine, yellow-poplar.
					Loblolly pine--------	90	
					Sweetgum-------------	90	
MP:							
Memphis------------	1r	Moderate	Slight	Slight	Loblolly pine--------	90	Loblolly pine, yellow-poplar.
					Sweetgum-------------	90	
Kisatchie----------	4d	Severe	Moderate	Moderate	Loblolly pine--------	70	Loblolly pine.
					Longleaf pine--------	---	
					Shortleaf pine-------	---	
Oula---------------	3c	Severe	Moderate	Slight	Loblolly pine--------	85	Loblolly pine.
					Shortleaf pine-------	75	

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
MS:							
Memphis	1r	Moderate	Slight	Slight	Loblolly pine Sweetgum	90 90	Loblolly pine, yellow-poplar.
Smithdale	2r	Moderate	Moderate	Slight	Shortleaf pine Loblolly pine Longleaf pine	69 86 69	Loblolly pine.
Mt Moreland	2w	Slight	Severe	Moderate	Green ash Eastern cottonwood Sweetgum American sycamore Water oak Cherrybark oak	75 100 90 --- 90 90	Eastern cottonwood, American sycamore.
Ne Necessity	2w	Slight	Moderate	Slight	Loblolly pine Sweetgum Cherrybark oak Water oak	90 --- --- ---	Loblolly pine.
No Norwood	2o	Slight	Slight	Slight	Eastern cottonwood	100	Eastern cottonwood.
OA:							
Oula	3c	Severe	Moderate	Slight	Loblolly pine Shortleaf pine	85 75	Loblolly pine.
Providence	2o	Slight	Slight	Slight	Loblolly pine Longleaf pine Sweetgum	87 73 90	Loblolly pine, sweetgum.
Smithdale	2r	Moderate	Moderate	Slight	Shortleaf pine Loblolly pine Longleaf pine	69 86 69	Loblolly pine.
OP:							
Oula	3c	Severe	Moderate	Slight	Loblolly pine Shortleaf pine	85 75	Loblolly pine.
Providence	2o	Slight	Slight	Slight	Loblolly pine Longleaf pine Sweetgum	87 73 90	Loblolly pine, sweetgum.
Pa, Pd Perry	2w	Slight	Severe	Moderate	Cherrybark oak Green ash Sugarberry Water oak Overcup oak Water hickory	--- 72 --- --- --- ---	Eastern cottonwood, sweetgum, American sycamore.
Pe Perry	3w	Slight	Severe	Severe	Overcup oak Black willow Baldcypress Water hickory	--- --- --- ---	Eastern cottonwood, baldcypress.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
Pr: Providence	2o	Slight	Slight	Slight	Loblolly pine	87	Loblolly pine, sweetgum.
					Longleaf pine	73	
					Sweetgum	90	
Ra: Rilla	2o	Slight	Slight	Slight	Eastern cottonwood	100	Eastern cottonwood, American sycamore.
					Cherrybark oak	100	
					Nuttall oak	85	
					Sweetgum	100	
					Pecan	---	
					American sycamore	---	
Rn, Rp: Roxana	1o	Slight	Slight	Slight	Eastern cottonwood	115	Eastern cottonwood, American sycamore.
					Sweetgum	100	
					Pecan	---	
					American sycamore	---	
					Water oak	---	
					Cherrybark oak	---	
Sh: Sharkey	2w	Slight	Severe	Moderate	Sweetgum	90	Eastern cottonwood, American sycamore, sweetgum.
					Willow oak	100	
					Water oak	90	
					Nuttall oak	90	
					Sugarberry	---	
Sk: Sharkey	2w	Slight	Severe	Severe	Nuttall oak	---	Eastern cottonwood, American sycamore.
					Sugarberry	---	
					Water hickory	---	
					Green ash	---	
					Overcup oak	---	
Sm: Sharkey	3w	Slight	Severe	Severe	Water hickory	---	Baldcypress.
					Overcup oak	---	
					Baldcypress	---	
					Black willow	---	
Sn: Sharkey	2w	Slight	Severe	Moderate	Sweetgum	90	Eastern cottonwood, American sycamore, sweetgum.
					Willow oak	100	
					Water oak	90	
					Nuttall oak	90	
					Sugarberry	---	
SP: Smithdale	2r	Moderate	Moderate	Slight	Shortleaf pine	69	Loblolly pine.
					Loblolly pine	86	
					Longleaf pine	69	
Oula	3c	Severe	Moderate	Slight	Loblolly pine	85	Loblolly pine.
					Shortleaf pine	75	
Providence	2o	Slight	Slight	Slight	Loblolly pine	87	Loblolly pine, sweetgum.
					Longleaf pine	73	
					Sweetgum	90	

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
SR:							
Smithdale	2r	Moderate	Moderate	Slight	Loblolly pine	80	Loblolly pine.
					Shortleaf pine	69	
					Loblolly pine	86	
					Longleaf pine	69	
Lucy	3s	Moderate	Moderate	Severe	Longleaf pine	71	Loblolly pine.
					Loblolly pine	84	
Providence	2o	Slight	Slight	Slight	Loblolly pine	87	Loblolly pine, sweetgum.
					Longleaf pine	73	
					Sweetgum	90	
Ss: Sostien	2w	Slight	Severe	Moderate	Eastern cottonwood	---	Eastern cottonwood.
					Sugarberry	---	
					Black willow	---	
					Nuttall oak	---	
St: Sterlington	2o	Slight	Slight	Slight	Green ash	75	Eastern cottonwood.
					Eastern cottonwood	---	
					Cherrybark oak	95	
					Water oak	90	
					Pecan	---	
					Sweetgum	90	
SW:							
Sweatman	3c	Moderate	Moderate	Moderate	Loblolly pine	83	Loblolly pine, shortleaf pine.
					Shortleaf pine	73	
Smithdale	2r	Moderate	Moderate	Slight	Shortleaf pine	69	Loblolly pine.
					Loblolly pine	86	
					Longleaf pine	69	
Ta: Tensas	2w	Slight	Severe	Moderate	Green ash	80	Eastern cottonwood, American sycamore.
					Water oak	95	
					Willow oak	---	
					Sweetgum	100	
					Nuttall oak	---	
Te: Tensas	3w	Slight	Severe	Severe	Nuttall oak	80	Eastern cottonwood, baldcypress.
					Water hickory	---	
					Overcup oak	80	
					Sugarberry	---	
Tn:							
Tensas	2w	Slight	Severe	Moderate	Green ash	80	Eastern cottonwood, American sycamore.
					Water oak	95	
					Willow oak	---	
					Sweetgum	100	
					Nuttall oak	---	
Alligator	2w	Slight	Severe	Moderate	Eastern cottonwood	95	Eastern cottonwood, American sycamore.
					Green ash	80	
					Water oak	90	
					Sweetgum	90	
Ts:							
Tensas	3w	Slight	Severe	Severe	Nuttall oak	80	Eastern cottonwood, baldcypress.
					Water hickory	---	
					Overcup oak	80	
					Sugarberry	---	

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
Ts:							
Alligator----------	2w	Slight	Severe	Severe	Eastern cottonwood--- Green ash------------ Water oak------------ Baldcypress-----------	95 80 90 ---	Eastern cottonwood, green ash, sweetgum, American sycamore.

TABLE 9.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AA:					
Alaga	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lucy	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Ag Alligator	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, too clayey, flooding.
At Alligator	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.
Ba Bayoudan	Severe: slope, percs slowly, too clayey.	Severe: slope, too clayey, percs slowly.	Severe: slope, too clayey, percs slowly.	Severe: too clayey.	Severe: slope, percs slowly, too clayey.
Br, Bs Bursley	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Co Calhoun	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Cs Calhoun	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Cw Calloway	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Cy Calloway	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
De Dundee	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Dh Dundee	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Dn------------------- Dundee	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Ds:					
Dundee---------------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
Alligator------------	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Fa------------------- Fausse	Severe: flooding, ponding, percs slowly.	Severe: ponding, too clayey.	Severe: too clayey, ponding.	Severe: ponding, too clayey.	Severe: ponding, flooding, too clayey.
Fd, Fo--------------- Forestdale	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Gt------------------- Guyton	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Gy------------------- Guyton	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Hb------------------- Hebert	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
He------------------- Hebert	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Hh------------------- Hebert	Severe: flooding.	Moderate: wetness, percs slowly, flooding.	Severe: flooding.	Moderate: wetness.	Severe: flooding.
Lo------------------- Loring	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight----------	Slight.
Lr------------------- Loring	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly, flooding.	Slight----------	Moderate: flooding.
Me------------------- Memphis	Slight----------	Slight----------	Slight----------	Slight----------	Slight.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Mh: Memphis	Slight	Slight	Moderate: slope.	Slight	Slight.
Mm: Memphis	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MP:					
Memphis	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Kisatchie	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, erodes easily.	Severe: slope.
Oula	Severe: slope, percs slowly, too clayey.	Severe: slope, too clayey, percs slowly.	Severe: slope, too clayey, percs slowly.	Severe: too clayey, slope.	Severe: slope, too clayey.
MS:					
Memphis	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mt: Moreland	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Ne: Necessity	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
No: Norwood	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
OA:					
Oula	Severe: slope, percs slowly, too clayey.	Severe: slope, too clayey, percs slowly.	Severe: slope, too clayey, percs slowly.	Severe: too clayey, slope.	Severe: slope, too clayey.
Providence	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
OP:					
Oula	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Moderate: slope.	Severe: slope.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
OP:					
Providence	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Pa: Perry	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pd: Perry	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, too clayey, flooding.
Pe: Perry	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.
Pg. Pits					
Pr: Providence	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Moderate: wetness.
Ra: Rilla	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Rn: Roxana	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Rp: Roxana	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Sh: Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Sk: Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, too clayey, flooding.
Sm: Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.
Sn: Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SP:					
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Oula	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.
Providence	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, wetness.
SR:					
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Lucy	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Providence	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Ss: Sostien	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: too clayey, wetness.	Severe: wetness, too clayey, flooding.
St: Sterlington	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
SW:					
Sweatman	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily, slope.	Severe: slope.
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Ta, Te: Tensas	Severe: flooding, wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
Tn, Ts:					
Tensas	Severe: flooding, wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
Alligator	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
UD. Udifluvents					

TABLE 10.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AA:											
Alaga	Poor	Fair	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.
Smithdale	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lucy	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ag Alligator	Fair	Fair	Fair	Fair	Good	Fair	Good	Good	Fair	Fair	Good.
At Alligator	Poor	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Ba Bayoudan	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Br, Bs Bursley	Good	Good	Good	Good	Fair	Good	Good	Fair	Good	Good	Fair.
Co, Cs Calhoun	Poor	Fair	Fair	Good	Good	Good	Good	Good	Fair	Fair	Good.
Cw, Cy Calloway	Fair	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
De Dundee	Fair	Good	Good	Good	---	Good	Fair	Fair	Good	Good	Fair.
Dh Dundee	Fair	Good	Good	Good	---	Good	Poor	Fair	Good	Good	Fair.
Dn Dundee	Fair	Good	Good	Good	---	Good	Fair	Fair	Good	Good	Fair.
Ds:											
Dundee	Fair	Good	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
Alligator	Fair	Fair	Fair	Fair	---	Fair	Good	Good	Fair	Fair	Good.
Fa Fausse	Very poor.	Very poor.	Very poor.	Poor	---	Poor	Good	Good	Very poor.	Fair	Good.
Fd Forestdale	Fair	Fair	Good	Fair	---	Fair	Good	Good	Fair	Fair	Good.
Fo Forestdale	Fair	Fair	Fair	Fair	---	Fair	Good	Good	Fair	Fair	Good.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Gt----------------- Guyton	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Fair	Good.
Gy----------------- Guyton	Poor	Fair	Fair	Fair	Fair	Poor	Good	Good	Poor	Fair	Good.
Hb, He, Hh--------- Hebert	Good	Good	Good	Good	---	Good	Fair	Fair	Good	Good	Fair.
Lo, Lr------------- Loring	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Me, Mh------------- Memphis	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Mm----------------- Memphis	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MP:											
Memphis------------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Kisatchie----------	Very poor.	Poor	Fair	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Oula---------------	Very poor.	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MS:											
Memphis------------	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Smithdale----------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mt----------------- Moreland	Fair	Fair	Fair	Good	---	Good	Good	Good	Fair	Good	Good.
Ne----------------- Necessity	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
No----------------- Norwood	Good	Good	Fair	Good	---	Fair	Poor	Very poor.	Good	---	Very poor.
OA:											
Oula---------------	Poor	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Providence---------	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Smithdale----------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
OP:											
Oula---------------	Poor	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Providence---------	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Pa: Perry	Fair	Fair	Fair	Good	---	Fair	Good	Good	Fair	Good	Good.
Pd, Pe: Perry	Poor	Fair	Fair	Fair	---	Poor	Fair	Fair	Fair	Fair	Fair.
Pg. Pits											
Pr: Providence	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ra: Rilla	Good	Good	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
Rn: Roxana	Good	Good	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
Rp: Roxana	Poor	Fair	Fair	Good	---	Good	Poor	Very poor.	Fair	Good	Very poor.
Sh, Sk: Sharkey	Fair	Fair	Fair	Good	---	Good	Good	Good	Fair	Good	Good.
Sm: Sharkey	Poor	Poor	Fair	Good	---	Poor	Fair	Fair	Poor	Fair	Fair.
Sn: Sharkey	Fair	Fair	Fair	Good	---	Good	Good	Good	Fair	Good	Good.
SP:											
Smithdale	Very poor.	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Oula	Very poor.	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Providence	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SR:											
Smithdale	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lucy	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Providence	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ss: Sostien	Fair	Fair	Fair	Good	---	Good	Good	Fair	Fair	Good	Fair.
St: Sterlington	Good	Good	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
SW:											
Sweatman	Poor	Fair	Fair	Good	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
Smithdale	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Ta----------------- Tensas	Fair	Fair	Fair	Good	---	Good	Good	Good	Fair	Good	Good.
Te----------------- Tensas	Fair	Fair	Fair	Good	---	Good	Good	Good	Poor	Good	Good.
Tn:											
Tensas------------	Fair	Fair	Fair	Good	---	Good	Good	Good	Fair	Good	Good.
Alligator---------	Fair	Fair	Fair	Fair	---	Fair	Good	Good	Fair	Fair	Good.
Ts:											
Tensas------------	Fair	Fair	Fair	Good	---	Good	Good	Good	Poor	Good	Good.
Alligator---------	Fair	Fair	Fair	Fair	---	Fair	Good	Good	Fair	Fair	Good.
UD. Udifluvents											

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AA:					
Alaga	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lucy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ag Alligator	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, too clayey.
At Alligator	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.
Ba Bayoudan	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, shrink-swell, slippage.	Severe: slope, percs slowly, too clayey.
Br, Bs Bursley	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: low strength, wetness, flooding.	Severe: wetness.
Co Calhoun	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Cs Calhoun	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Cw Calloway	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
Cy Calloway	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Moderate: wetness, flooding.
De, Dh, Dn Dundee	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: wetness, flooding.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ds:					
Dundee	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength, flooding.	Moderate: wetness, flooding.
Alligator	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, too clayey.
Fa: Fausse	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding, too clayey.
Fd: Forestdale	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, shrink-swell, wetness, flooding.	Severe: wetness.
Fo: Forestdale	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: wetness.
Gt: Guyton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Gy: Guyton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Hb, He: Hebert	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: wetness, flooding.
Hh: Hebert	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding, low strength.	Moderate: flooding, wetness.
Lo: Loring	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: low strength.	Slight.
Lr: Loring	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Me, Mh: Memphis	Slight	Slight	Slight	Severe: low strength.	Slight.
Mm: Memphis	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
MP:					
Memphis	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MP:					
Kisatchie	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Oula	Severe: slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
MS:					
Memphis	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mt: Moreland	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, too clayey.
Ne: Necessity	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Moderate: wetness, flooding.
No: Norwood	Slight	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
OA:					
Oula	Severe: slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
Providence	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
OP:					
Oula	Severe: slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Providence	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
Pa: Perry	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pd: Perry	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, too clayey, flooding.
Pe: Perry	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.
Pg. Pits					
Pr: Providence	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
Ra: Rilla	Moderate: too clayey, wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Rn: Roxana	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.
Rp: Roxana	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Sh: Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell, flooding.	Severe: wetness, too clayey.
Sk: Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, too clayey, flooding.
Sm: Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.
Sn: Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell, flooding.	Severe: wetness, too clayey.
SP: Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Oula	Severe: slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Providence	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SR:					
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lucy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Providence	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
Ss: Sostien	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, low strength, wetness.	Severe: wetness, too clayey, flooding.
St: Sterlington	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
SW:					
Sweatman	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Smithdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ta: Tensas	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: too clayey.
Te: Tensas	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: too clayey, flooding.
Tn:					
Tensas	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: too clayey.
Alligator	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, too clayey.
Ts:					
Tensas	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: too clayey, flooding.
Alligator	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, too clayey, flooding.
UD. Udifluvents					

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AA:					
Alaga	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Smithdale	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Lucy	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
Ag, At: Alligator	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Ba: Bayoudan	Severe: percs slowly, slope, slippage.	Severe: slope, slippage.	Severe: slope, too clayey, slippage.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
Br, Bs: Bursley	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
Co: Calhoun	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Cs: Calhoun	Severe: flooding, wetness, percs slowly.	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Cw: Calloway	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Cy: Calloway	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
De, Dh, Dn: Dundee	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Fair: wetness.
Ds:					
Dundee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ds:					
Alligator	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Fa Fausse	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
Fd Forestdale	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
Fo Forestdale	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Gt Guyton	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
Gy Guyton	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Hb, He Hebert	Severe: flooding, wetness, percs slowly.	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Hh Hebert	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Lo Loring	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
Lr Loring	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Fair: wetness.
Me Memphis	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Mh Memphis	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Mm Memphis	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MP:					
Memphis	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Kisatchie	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Oula	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
MS:					
Memphis	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Smithdale	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Mt Moreland	Severe: wetness, percs slowly, flooding.	Severe: flooding, wetness.	Severe: wetness, too clayey, flooding.	Severe: wetness, flooding.	Poor: too clayey, hard to pack, wetness.
Ne Necessity	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
No Norwood	Severe: flooding.	Moderate: seepage.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
OA:					
Oula	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Providence	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Smithdale	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
OP:					
Oula	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Providence	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ds:					
Alligator	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Fa Fausse	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
Fd Forestdale	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
Fo Forestdale	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Gt Guyton	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
Gy Guyton	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Hb, He Hebert	Severe: flooding, wetness, percs slowly.	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Hh Hebert	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Lo Loring	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
Lr Loring	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Fair: wetness.
Me Memphis	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Mh Memphis	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Mm Memphis	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MP:					
Memphis	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Kisatchie	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Oula	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
MS:					
Memphis	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Smithdale	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Mt Moreland	Severe: wetness, percs slowly, flooding.	Severe: flooding, wetness.	Severe: wetness, too clayey, flooding.	Severe: wetness, flooding.	Poor: too clayey, hard to pack, wetness.
Ne Necessity	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
No Norwood	Severe: flooding.	Moderate: seepage.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
OA:					
Oula	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Providence	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Smithdale	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
OP:					
Oula	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Providence	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pa------------------ Perry	Severe: wetness, percs slowly, flooding.	Severe: flooding, wetness.	Severe: wetness, too clayey, flooding.	Severe: wetness, flooding.	Poor: too clayey, hard to pack, wetness.
Pd, Pe-------------- Perry	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Pg. Pits					
Pr------------------ Providence	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Ra------------------ Rilla	Severe: flooding.	Moderate: seepage, wetness.	Severe: flooding.	Severe: flooding.	Good.
Rn------------------ Roxana	Severe: flooding.	Moderate: seepage, wetness.	Severe: flooding.	Severe: flooding.	Good.
Rp------------------ Roxana	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
Sh------------------ Sharkey	Severe: wetness, percs slowly, flooding.	Severe: flooding, wetness.	Severe: wetness, too clayey, flooding.	Severe: wetness, flooding.	Poor: too clayey, hard to pack, wetness.
Sk, Sm-------------- Sharkey	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Sn------------------ Sharkey	Severe: wetness, percs slowly, flooding.	Severe: flooding, wetness.	Severe: wetness, too clayey, flooding.	Severe: wetness, flooding.	Poor: too clayey, hard to pack, wetness.
SP: Smithdale----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Oula---------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Providence---------	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
SR: Smithdale----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SR:					
Lucy	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
Providence	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Ss: Sostien	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
St: Sterlington	Severe: flooding.	Moderate: seepage.	Severe: flooding.	Severe: flooding.	Good.
SW:					
Sweatman	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Smithdale	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Ta: Tensas	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
Te: Tensas	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Tn:					
Tensas	Severe: wetness, percs slowly, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
Alligator	Severe: wetness, percs slowly, flooding.	Severe: flooding, wetness.	Severe: wetness, too clayey, flooding.	Severe: wetness, flooding.	Poor: too clayey, hard to pack, wetness.
Ts:					
Tensas	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Alligator	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
UD. Udifluvents					

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AA:				
Alaga	Fair: slope.	Probable	Improbable: too sandy.	Poor: slope.
Smithdale	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lucy	Fair: slope.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: slope.
Ag, At: Alligator	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Ba: Bayoudan	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Br, Bs: Bursley	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Co, Cs: Calhoun	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Cw, Cy: Calloway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
De, Dh: Dundee	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Dn: Dundee	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Ds:				
Dundee	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Alligator	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Fa: Fausse	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Fd, Fo: Forestdale	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Gt, Gy: Guyton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Hb: Hebert	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
He: Hebert	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Hh: Hebert	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Lo, Lr: Loring	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Me, Mh: Memphis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Mm: Memphis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
MP:				
Memphis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Kisatchie	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Oula	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MS:				
Memphis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Smithdale	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Mt: Moreland	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Ne: Necessity	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
No: Norwood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
OA:				
Oula	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
OA:				
Providence	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Smithdale	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
OP:				
Oula	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Providence	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Pa: Perry	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Pd, Pe: Perry	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Pg. Pits				
Pr: Providence	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ra: Rilla	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Rn, Rp: Roxana	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Good.
Sh, Sk, Sm, Sn: Sharkey	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
SP:				
Smithdale	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Oula	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Providence	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
SR:				
Smithdale	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lucy	Fair: slope.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: slope.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
SR:				
Providence	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Ss Sostien	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
St Sterlington	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
SW:				
Sweatman	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Smithdale	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ta, Te Tensas	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Tn, Ts:				
Tensas	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Alligator	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
UD. Udifluvents				

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
AA:						
Alaga	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Smithdale	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
Lucy	Severe: seepage.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope, droughty.
Ag, At Alligator	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
Ba Bayoudan	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly, slippage.	Slope, percs slowly.
Br, Bs Bursley	Moderate: seepage.	Severe: wetness.	Severe: no water.	Flooding	Erodes easily, wetness.	Wetness, erodes easily, rooting depth.
Co Calhoun	Slight	Severe: piping, wetness.	Severe: no water.	Percs slowly	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
Cs Calhoun	Slight	Severe: piping, wetness.	Severe: no water.	Flooding	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
Cw Calloway	Moderate: seepage.	Severe: thin layer.	Severe: no water.	Percs slowly	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
Cy Calloway	Slight	Severe: thin layer.	Severe: no water.	Flooding	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
De, Dh, Dn Dundee	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Flooding	Erodes easily, wetness.	Erodes easily.
Ds:						
Dundee	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Flooding	Erodes easily, wetness.	Erodes easily.
Alligator	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
Fa Fausse	Slight	Severe: hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Wetness, percs slowly.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Fd------------- Forestdale	Slight---------	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
Fo------------- Forestdale	Slight---------	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
Gt------------- Guyton	Moderate: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, flooding.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Gy------------- Guyton	Moderate: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, flooding.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Hb, He---------- Hebert	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Flooding-------	Erodes easily, wetness.	Erodes easily.
Hh------------- Hebert	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Flooding-------	Erodes easily, wetness.	Erodes easily.
Lo------------- Loring	Moderate: seepage.	Moderate: piping.	Severe: no water.	Favorable------	Erodes easily, wetness.	Erodes easily, rooting depth.
Lr------------- Loring	Moderate: seepage.	Moderate: piping.	Severe: no water.	Flooding-------	Erodes easily, wetness.	Erodes easily, rooting depth.
Me------------- Memphis	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
Mh------------- Memphis	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
Mm------------- Memphis	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
MP:						
Memphis--------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Kisatchie------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Oula-----------	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.
MS:						
Memphis--------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Smithdale------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
Mt------------- Moreland	Slight---------	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Ne: Necessity	Slight	Moderate: piping, wetness.	Severe: no water.	Percs slowly, flooding.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
No: Norwood	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water, flooding.	Erodes easily	Erodes easily.
OA:						
Oula	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.
Providence	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Severe: no water.	Slope	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Smithdale	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
OP:						
Oula	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Providence	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Severe: no water.	Slope	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Pa: Perry	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
Pd, Pe: Perry	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
Pg. Pits						
Pr: Providence	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Severe: no water.	Slope	Erodes easily, wetness.	Erodes easily, rooting depth.
Ra: Rilla	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water, flooding.	Erodes easily	Erodes easily.
Rn, Rp: Roxana	Moderate: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water, flooding.	Erodes easily	Erodes easily.
Sh: Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness.
Sk, Sm: Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Sn: Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness.
SP:						
Smithdale	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
Oula	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Providence	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Severe: no water.	Slope	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
SR:						
Smithdale	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
Lucy	Severe: seepage.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope, droughty.
Providence	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Severe: no water.	Slope	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Ss: Sostien	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
St: Sterlington	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water, flooding.	Erodes easily	Erodes easily.
SW:						
Sweatman	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Smithdale	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
Ta: Tensas	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Te: Tensas	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Tn:						
Tensas	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, slope, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Alligator	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
Ts:						
Tensas	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding, slope.	Erodes easily, wetness.	Wetness, erodes easily.
Alligator	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
UD. Udifluvents						

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
AA:											
Alaga	0-4	Loamy sand	SM, SW-SM, SP-SM	A-2, A-1-B	0	100	100	40-70	10-35	---	NP
	4-92	Loamy sand, loamy fine sand.	SM, SW-SM, SP-SM	A-2	0	100	100	50-80	10-35	---	NP
Smithdale	0-11	Fine sandy loam	SM, SM-SC	A-4, A-2	0	100	85-100	60-95	28-49	<20	NP-5
	11-30	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-96	45-75	23-38	7-16
	30-70	Loam, sandy loam.	SM, ML, CL SC	A-4	0	100	85-100	65-95	36-70	<30	NP-10
Lucy	0-30	Loamy fine sand	SM, SP-SM	A-2	0	98-100	95-100	50-87	10-30	---	NP
	30-48	Sandy loam, clay loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	97-100	95-100	55-95	15-50	<30	NP-15
	48-62	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, SM	A-2, A-6, A-4	0	100	95-100	60-95	20-50	20-40	3-20
Ag Alligator	0-4	Clay	CH	A-7	0	100	100	95-100	95-100	52-75	30-50
	4-60	Clay	CH	A-7	0	100	100	100	95-100	62-94	33-64
At Alligator	0-5	Clay	CH	A-7	0	100	100	95-100	95-100	52-75	30-50
	5-60	Clay	CH	A-7	0	100	100	100	95-100	62-94	33-64
Ba Bayoudan	0-2	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-90	25-55
	2-18	Clay	CH	A-7-6	0	100	100	95-100	90-100	75-90	48-60
	18-63	Clay	CH	A-7-6	0	100	100	95-100	90-100	75-90	48-60
Br Bursley	0-15	Silt loam	CL-ML, ML, CL	A-4, A-6	0	100	100	90-100	70-90	20-35	3-15
	15-45	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-90	27-40	12-20
	45-64	Very fine sandy loam, loam, silty clay loam.	CL, CL-ML	A-6, A-4, A-7-6	0	100	100	85-100	60-90	25-43	5-22
Bs Bursley	0-18	Silty clay loam	CL-ML, ML, CL	A-4, A-6	0	100	100	90-100	70-90	20-35	3-15
	18-46	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-90	27-40	12-20
	46-72	Very fine sandy loam, loam, silty clay loam.	CL, CL-ML	A-6, A-4, A-7-6	0	100	100	85-100	60-90	25-43	5-22
Co Calhoun	0-20	Silt loam	CL-ML, ML, CL	A-4	0	100	100	100	95-100	<31	NP-10
	20-49	Silty clay loam, silt loam.	CL	A-6, A-7-6	0	100	100	95-100	95-100	30-45	11-24
	49-80	Silt loam	CL, CL-ML	A-6, A-4	0	100	100	100	90-100	25-40	5-20

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Cs------------- Calhoun	0-21	Silt loam--------	CL-ML, ML, CL	A-4	0	100	100	100	95-100	<31	NP-10
	21-47	Silty clay loam, silt loam.	CL	A-6, A-7-6	0	100	100	95-100	95-100	30-45	11-24
	47-68	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	100	90-100	25-40	5-20
Cw------------- Calloway	0-24	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	90-100	25-35	5-15
	24-36	Silt loam, silty clay loam.	CL	A-6	0	100	100	100	90-95	30-40	12-20
	36-60	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	100	90-100	25-35	5-15
Cy------------- Calloway	0-29	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	90-100	25-35	5-15
	29-40	Silt loam, silty clay loam.	CL	A-6	0	100	100	100	90-95	30-40	12-20
	40-64	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	100	90-100	25-35	5-15
De------------- Dundee	0-4	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-98	20-35	3-11
	4-49	Silty clay loam, loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	70-95	28-44	12-22
	49-60	Loam, very fine sandy loam, silt loam.	CL, CL-ML, ML	A-4	0	100	100	85-100	60-90	<30	NP-8
Dh------------- Dundee	0-4	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-98	20-35	3-11
	4-48	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	70-95	28-44	12-22
	48-60	Loam, very fine sandy loam, silt loam.	CL, CL-ML, ML	A-4	0	100	100	85-100	60-90	<30	NP-8
Dn------------- Dundee	0-5	Silty clay loam	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-98	20-35	3-11
	5-40	Silty clay loam, clay loam, sandy clay loam.	CL	A-6, A-7	0	100	100	90-100	70-95	28-44	12-22
	40-60	Loam, very fine sandy loam, silt loam.	CL, CL-ML, ML	A-4	0	100	100	85-100	60-90	<30	NP-8
Ds: Dundee----------	0-4	Silty clay loam	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-98	20-35	3-11
	4-57	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	70-95	28-44	12-22
	57-60	Loam, very fine sandy loam, silt loam.	CL, CL-ML, ML	A-4	0	100	100	85-100	60-90	<30	NP-8
Alligator-------	0-6	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	52-75	30-50
	6-46	Clay-------------	CH	A-7	0	100	100	100	95-100	62-94	33-64
	46-60	Clay-------------	CH	A-7	0	100	100	100	95-100	62-94	33-64

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Fa-------------- Fausse	0-8	Clay-------------	CH, MH	A-7-6, A-7-5	0	100	100	100	95-100	50-100	21-71
	8-47	Clay-------------	CH, MH	A-7-6, A-7-5	0	100	100	100	95-100	50-100	21-71
	47-60	Clay-------------	CH	A-7-6	0	100	100	100	95-100	60-100	31-71
Fd-------------- Forestdale	0-5	Silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	90-100	30-58	12-30
	5-24	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	40-65	20-40
	24-60	Silty clay loam, silt loam, clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	100	95-100	75-100	20-50	5-30
Fo-------------- Forestdale	0-7	Silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	90-100	30-58	12-30
	7-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	40-65	20-40
	30-62	Silty clay loam, silt loam, clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	100	95-100	75-100	20-50	5-30
Gt-------------- Guyton	0-16	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-7
	16-39	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	94-100	75-95	22-40	6-18
	39-60	Silt loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	50-95	<40	NP-18
Gy-------------- Guyton	0-28	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-7
	28-55	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	94-100	75-95	22-40	6-18
	55-70	Silt loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	50-95	<40	NP-18
Hb-------------- Hebert	0-9	Silt loam--------	ML, CL-ML	A-4	0	100	100	100	65-100	<27	NP-7
	9-48	Loam, silt loam, silty clay loam.	CL	A-6, A-7-6	0	100	100	100	85-100	31-45	11-22
	48-65	Stratified very fine sandy loam to silty clay loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	60-100	22-40	3-18
He-------------- Hebert	0-5	Silty clay loam	CL	A-6	0	100	100	100	80-100	31-40	11-18
	5-40	Loam, silt loam, silty clay loam.	CL	A-6, A-7-6	0	100	100	100	85-100	31-45	11-22
	40-60	Stratified very fine sandy loam to silty clay loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	60-100	22-40	3-18
Hh-------------- Hebert	0-4	Silt loam--------	ML, CL-ML	A-4	0	100	100	100	65-100	<27	NP-7
	4-53	Loam, silt loam, silty clay loam.	CL	A-6, A-7-6	0	100	100	100	85-100	31-45	11-22
	53-60	Stratified very fine sandy loam to silty clay loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	60-100	22-40	3-18

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lo----------------- Loring	0-6	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	6-30	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	8-20
	30-52	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-22
	52-60	Silt loam--------	CL, ML	A-4, A-6, A-7	0	100	100	95-100	70-100	28-45	7-20
Lr----------------- Loring	0-7	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	7-29	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	8-20
	29-60	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-22
	50-65	Silt loam--------	CL, ML	A-4, A-6, A-7	0	100	100	95-100	70-100	28-45	7-20
Me----------------- Memphis	0-5	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	90-100	<30	NP-10
	5-44	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	90-100	35-48	15-25
	44-71	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	6-15
Mh----------------- Memphis	0-5	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	90-100	<30	NP-10
	5-19	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	90-100	35-48	15-25
	19-64	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	6-15
Mm----------------- Memphis	0-5	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	90-100	<30	NP-10
	5-37	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	90-100	35-48	15-25
	37-60	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	6-15
MP: Memphis----------	0-3	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	90-100	<30	NP-10
	3-20	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	90-100	35-48	15-25
	20-70	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	6-15
Kisatchie--------	0-6	Silt loam--------	ML, CL-ML	A-4	0	100	100	85-100	50-75	<25	NP-4
	6-27	Silty clay, clay.	CH, CL	A-7-6	0	100	100	90-100	85-95	45-65	22-36
	27-34	Silty clay, clay.	CH, CL	A-7-6	0-5	85-95	65-75	55-65	50-60	45-65	22-36
	34-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oula-------------	0-2	Silty clay--------	CH, CL	A-6, A-7-6	0	100	100	95-100	85-95	30-55	12-30
	2-28	Clay, silty clay	CH	A-7-6	0-5	100	100	90-100	75-95	51-70	25-40
	28-60	Sandy clay, clay, sandy clay loam, silty clay.	CH, CL, SC	A-6, A-7	0-15	100	100	80-100	35-95	25-70	12-40

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MS:											
Memphis---------	0-2	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	90-100	<30	NP-10
	2-23	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	90-100	35-48	15-25
	23-62	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	6-15
Smithdale-------	0-12	Fine sandy loam	SM, SM-SC	A-4, A-2	0	100	85-100	60-95	28-49	<20	NP-5
	12-38	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-96	45-75	23-38	7-16
	38-60	Loam, sandy loam.	SM, ML, CL SC	A-4	0	100	85-100	65-95	36-70	<30	NP-10
Mt--------------- Moreland	0-12	Clay------------	CH	A-7-6	0	100	95-100	90-100	90-100	51-74	25-45
	12-46	Clay, silty clay.	CH	A-7-6	0	100	95-100	90-100	90-100	51-74	25-45
	46-67	Clay, silty clay.	CH, CL	A-7-6, A-6	0	100	100	100	90-100	35-74	25-45
Ne--------------- Necessity	0-5	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	80-100	<27	NP-7
	5-27	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	75-100	30-40	11-17
	27-80	Loam, clay loam.	CL	A-6	0	100	100	90-100	75-100	30-40	11-17
No--------------- Norwood	0-9	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	51-90	20-35	4-15
	9-17	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	100	90-100	60-98	25-46	7-26
	17-60	Silt loam, very fine sandy loam, silty clay loam.	CL, ML, CL-ML	A-4, A-6, A-7	0	100	100	90-100	70-98	20-45	2-25
OA:											
Oula------------	0-2	Silty clay-------	CH, CL	A-6, A-7-6	0	100	100	95-100	85-95	30-55	12-30
	2-43	Clay, silty clay, clay loam.	CH	A-7-6	0-5	100	100	90-100	75-95	51-70	25-40
	43-60	Sandy clay, clay, sandy clay loam.	CH, CL, SC MH	A-6, A-7	0-15	100	100	80-100	35-95	25-70	12-40
Providence------	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	100	85-100	<30	NP-10
	7-27	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	30-45	11-20
	27-36	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-90	25-40	11-20
	36-47	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-4	0	100	95-100	70-95	40-80	20-35	8-18
	47-60	Sandy loam, sandy clay loam, loam.	SM, SC, CL ML	A-2, A-4	0	100	95-100	60-85	30-80	<30	NP-10
Smithdale-------	0-4	Fine sandy loam	SM, SM-SC	A-4, A-2	0	100	85-100	60-95	28-49	<20	NP-5
	4-19	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-96	45-75	23-38	7-16
	19-60	Loam, sandy loam.	SM, ML, CL SC	A-4	0	100	85-100	65-95	36-70	<30	NP-10

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
OP:											
Oula------------	0-3	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-100	50-90	<25	NP-7
	3-37	Clay, silty clay.	CH	A-7-6	0-5	100	100	90-100	75-95	51-70	25-40
	37-60	Sandy clay, clay, sandy clay loam.	CH, CL, SC MH	A-6, A-7	0-15	100	100	80-100	35-95	25-70	12-40
Providence------	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	100	85-100	<30	NP-10
	7-27	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	30-45	11-20
	27-33	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-90	25-40	11-20
	33-43	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-4	0	100	95-100	70-95	40-80	20-35	8-18
	43-60	Sandy loam, sandy clay loam, loam.	SM, SC, CL ML	A-2, A-4	0	100	95-100	60-85	30-80	<30	NP-10
Pa--------------- Perry	0-4	Silty clay loam	CL, CH	A-7-6	0	100	100	100	95-100	42-65	22-40
	4-31	Clay-------------	CH	A-7-6	0	100	100	100	95-100	60-80	33-50
	31-60	Clay-------------	CH, CL	A-7-6	0	90-100	85-100	75-100	70-100	45-80	22-50
Pd--------------- Perry	0-5	Clay-------------	CH, CL	A-7-6	0	100	100	100	95-100	45-75	22-45
	5-25	Clay-------------	CH	A-7-6	0	100	100	100	95-100	60-80	33-50
	25-60	Clay-------------	CH, CL	A-7-6	0	90-100	85-100	75-100	70-100	45-80	22-50
Pe--------------- Perry	0-8	Clay-------------	CH, CL	A-7-6	0	100	100	100	95-100	45-75	22-45
	8-26	Clay-------------	CH	A-7-6	0	100	100	100	95-100	60-80	33-50
	26-60	Clay-------------	CH, CL	A-7-6	0	90-100	85-100	75-100	70-100	45-80	22-50
Pg. Pits											
Pr--------------- Providence	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	100	85-100	<30	NP-10
	7-25	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	30-45	11-20
	25-33	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-90	25-40	11-20
	33-43	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-4	0	100	95-100	70-95	40-80	20-35	8-18
	43-60	Sandy loam, sandy clay loam, loam.	SM, SC, CL ML	A-2, A-4	0	100	95-100	60-85	30-80	<30	NP-10
Ra--------------- Rilla	0-6	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	90-100	<31	NP-10
	6-41	Silty clay loam, clay loam, silt loam.	CL	A-6, A-4	0	100	100	100	90-100	28-40	8-17
	41-60	Loam, silty clay loam, silt loam.	CL-ML, CL	A-4, A-6, A-7-6	0	100	100	100	75-100	23-45	4-21
Rn--------------- Roxana	0-6	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-100	50-75	<27	NP-7
	6-67	Silt loam, very fine sandy loam, loamy very fine sand.	ML, CL-ML	A-4	0	100	100	85-100	50-85	<27	NP-7

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Rp: Roxana	0-5	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-100	50-75	<27	NP-7
	5-88	Silt loam, very fine sandy loam, loamy very fine sand.	ML, CL-ML	A-4	0	100	100	85-100	50-85	<27	NP-7
Sh: Sharkey	0-4	Clay	CH, CL	A-7-6, A-7-5	0	100	100	100	95-100	46-85	22-50
	4-44	Clay	CH	A-7-6, A-7-5	0	100	100	100	95-100	56-85	30-50
	44-60	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7-6, A-7-5	0	100	100	100	95-100	32-85	11-50
Sk: Sharkey	0-4	Clay	CH, CL	A-7-6, A-7-5	0	100	100	100	95-100	46-85	22-50
	4-47	Clay	CH	A-7-6, A-7-5	0	100	100	100	95-100	56-85	30-50
	47-60	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7-6, A-7-5	0	100	100	100	95-100	32-85	11-50
Sm: Sharkey	0-9	Clay	CH, CL	A-7-6, A-7-5	0	100	100	100	95-100	46-85	22-50
	9-49	Clay	CH	A-7-6, A-7-5	0	100	100	100	95-100	56-85	30-50
	49-60	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7-6, A-7-5	0	100	100	100	95-100	32-85	11-50
Sn: Sharkey	0-6	Clay, silty clay loam.	CH, CL	A-7-6, A-7-5	0	100	100	100	95-100	46-85	22-50
	6-40	Clay	CH	A-7-6, A-7-5	0	100	100	100	95-100	56-85	30-50
	40-63	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7-6, A-7-5	0	100	100	100	95-100	32-85	11-50
SP: Smithdale	0-10	Fine sandy loam	SM, SM-SC	A-4, A-2	0	100	85-100	60-95	28-49	<20	NP-5
	10-26	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-96	45-75	23-38	7-16
	26-80	Loam, sandy loam.	SM, ML, CL SC	A-4	0	100	85-100	65-95	36-70	<30	NP-10
Oula	0-2	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-100	50-90	<25	NP-7
	2-43	Clay, silty clay	CH	A-7-6	0-5	100	100	90-100	75-95	51-70	25-40
	43-66	Sandy clay, loam, sandy clay loam.	CH, CL, SC MH	A-6, A-7	0-15	100	100	80-100	35-95	25-70	12-40
Providence	0-6	Silt loam	ML, CL, CL-ML	A-4	0	100	100	100	85-100	<30	NP-10
	6-30	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	30-45	11-20
	30-40	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-90	25-40	11-20
	40-51	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-4	0	100	95-100	70-95	40-80	20-35	8-18
	51-60	Sandy loam, sandy clay loam, loam.	SM, SC, CL ML	A-2, A-4	0	100	95-100	60-85	30-80	<30	NP-10

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SR:											
Smithdale-------	0-5	Fine sandy loam	SM, SM-SC	A-4, A-2	0	100	85-100	60-95	28-49	<20	NP-5
	5-26	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-96	45-75	23-38	7-16
	26-60	Loam, sandy loam.	SM, ML, CL SC	A-4	0	100	85-100	65-95	36-70	<30	NP-10
Lucy------------	0-30	Loamy fine sand	SM, SP-SM	A-2	0	98-100	95-100	50-87	10-30	---	NP
	30-42	Sandy loam, clay loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	97-100	95-100	55-95	15-50	<30	NP-15
	42-60	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, SM	A-2, A-6, A-4	0	100	95-100	60-95	20-50	20-40	3-20
Providence------	0-6	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	100	85-100	<30	NP-10
	6-24	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	30-45	11-20
	24-32	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-90	25-40	11-20
	32-43	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-4	0	100	95-100	70-95	40-80	20-35	8-18
	43-60	Sandy loam, sandy clay loam, loam.	SM, SC, CL ML	A-2, A-4	0	100	95-100	60-85	30-80	<30	NP-10
Ss--------------- Sostien	0-4	Clay-------------	CH	A-7-6	0	100	100	95-100	95-100	52-75	30-50
	4-60	Silty clay, clay.	CH	A-7-6	0	100	100	95-100	95-100	52-75	30-50
St--------------- Sterlington	0-7	Silt loam--------	ML	A-4	0	100	100	90-100	60-95	<23	NP-3
	7-54	Silt loam, very fine sandy loam.	CL-ML, ML	A-4	0	100	100	90-100	80-95	<28	NP-7
	54-66	Very fine sandy loam, silt loam, silty clay loam.	ML, CL-ML	A-4	0	100	100	90-100	80-95	<28	NP-7
SW:											
Sweatman--------	0-4	Fine sandy loam	CL-ML, CL, ML	A-4	0	100	100	90-100	55-90	<35	NP-10
	4-25	Clay, silty clay loam, silty clay.	MH	A-7	0	95-100	95-100	95-100	90-95	60-80	25-40
	25-62	Stratified sandy loam to weathered shale.	ML, MH	A-7	0	95-100	75-100	60-95	55-95	41-65	12-30
Smithdale-------	0-4	Fine sandy loam	SM, SM-SC	A-4, A-2	0	100	85-100	60-95	28-49	<20	NP-5
	4-14	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-96	45-75	23-38	7-16
	14-70	Loam, sandy loam.	SM, ML, CL SC	A-4	0	100	85-100	65-95	36-70	<30	NP-10
Ta--------------- Tensas	0-3	Silty clay, clay, silty clay loam.	CH, CL	A-7-6	0	100	100	100	95-100	46-70	22-40
	3-24	Clay, silty clay	CH	A-7-6	0	100	100	100	95-100	51-75	26-45
	24-60	Very fine sandy loam, silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	100	80-100	25-40	5-17

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Te----------------- Tensas	0-5	Silty clay--------	CH, CL	A-7-6	0	100	100	100	95-100	46-70	22-40
	5-22	Clay, silty clay	CH	A-7-6	0	100	100	100	95-100	51-75	26-45
	22-60	Very fine sandy loam, silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	100	80-100	25-40	5-17
Tn:											
Tensas-----------	0-5	Silty clay--------	CH, CL	A-7-6	0	100	100	100	95-100	46-70	22-40
	5-22	Clay, silty clay	CH	A-7-6	0	100	100	100	95-100	51-75	26-45
	22-60	Very fine sandy loam, silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	100	80-100	25-40	5-17
Alligator--------	0-5	Clay--------------	CH	A-7	0	100	100	95-100	95-100	52-75	30-50
	5-60	Clay--------------	CH	A-7	0	100	100	100	95-100	62-94	33-64
Ts:											
Tensas-----------	0-6	Silty clay--------	CH, CL	A-7-6	0	100	100	100	95-100	46-70	22-40
	6-28	Clay, silty clay	CH	A-7-6	0	100	100	100	95-100	51-75	26-45
	28-60	Very fine sandy loam, silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	100	80-100	25-40	5-17
Alligator--------	0-4	Clay--------------	CH	A-7	0	100	100	95-100	95-100	52-75	30-50
	4-60	Clay--------------	CH	A-7	0	100	100	100	95-100	62-94	33-64
UD. Udifluvents											

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
AA:										
Alaga-----------	0-4	2-12	1.50-1.70	>6.0	0.05-0.09	4.5-6.0	Low---------	0.17	5	.5-1
	4-92	2-12	1.50-1.70	>6.0	0.05-0.09	4.5-6.0	Low---------	0.17		
Smithdale-------	0-11	2-15	1.40-1.50	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28	5	.5-2
	11-30	18-33	1.40-1.55	0.6-2.0	0.15-0.17	4.5-5.5	Low---------	0.24		
	30-70	12-27	1.40-1.55	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28		
Lucy------------	0-30	1-12	1.30-1.70	6.0-20	0.06-0.10	5.1-6.0	Low---------	0.15	5	.5-1
	30-48	10-30	1.40-1.60	2.0-6.0	0.10-0.12	4.5-5.5	Low---------	0.24		
	48-62	15-35	1.40-1.60	0.6-2.0	0.12-0.14	4.5-5.5	Low---------	0.28		
Ag--------------- Alligator	0-4	40-60	1.20-1.50	<0.06	0.18-0.20	4.5-5.5	High--------	0.32	5	1-3
	4-49	60-85	1.20-1.50	<0.06	0.14-0.18	4.5-7.3	Very high	0.24		
	49-60	35-85	1.20-1.50	<0.06	0.14-0.18	6.1-7.3	Very high	0.24		
At--------------- Alligator	0-5	40-60	1.20-1.50	<0.06	0.18-0.20	4.5-5.5	High--------	0.32	5	1-3
	5-52	60-85	1.20-1.50	<0.06	0.14-0.18	4.5-7.3	Very high	0.24		
	52-60	35-85	1.20-1.50	<0.06	0.14-0.18	6.1-7.3	Very high	0.24		
Ba--------------- Bayoudan	0-2	30-80	1.20-1.40	<0.06	0.12-0.18	4.5-6.5	Very high	0.32	5	.5-3
	2-18	60-90	1.15-1.35	<0.06	0.12-0.18	3.6-5.5	Very high	0.32		
	18-63	60-90	1.15-1.35	<0.06	0.12-0.18	3.6-8.4	Very high	0.32		
Br--------------- Bursley	0-15	12-30	1.30-1.65	0.2-0.6	0.18-0.23	4.5-6.0	Low---------	0.43	5	.5-2
	15-45	18-32	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate----	0.43		
	45-64	15-35	1.30-1.80	0.2-0.6	0.15-0.20	4.5-7.3	Moderate----	0.49		
Bs--------------- Bursley	0-18	12-30	1.30-1.65	0.2-0.6	0.18-0.23	4.5-6.0	Low---------	0.43	5	.5-2
	18-46	18-32	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate----	0.43		
	46-72	15-35	1.30-1.80	0.2-0.6	0.15-0.20	4.5-7.3	Moderate----	0.49		
Co--------------- Calhoun	0-20	10-27	1.30-1.65	0.2-0.6	0.21-0.23	4.5-6.0	Low---------	0.49	5	.5-4
	20-49	10-35	1.30-1.70	0.06-0.2	0.20-0.22	4.5-6.0	Moderate----	0.43		
	49-80	10-27	1.40-1.70	0.2-0.6	0.21-0.23	4.5-7.8	Low---------	0.43		
Cs--------------- Calhoun	0-21	10-27	1.30-1.65	0.2-0.6	0.21-0.23	4.5-6.0	Low---------	0.49	5	.5-4
	21-47	10-35	1.30-1.70	0.06-0.2	0.20-0.22	4.5-6.0	Moderate----	0.43		
	47-68	10-27	1.40-1.70	0.2-0.6	0.21-0.23	4.5-7.8	Low---------	0.43		
Cw--------------- Calloway	0-24	10-30	1.40-1.55	0.6-2.0	0.20-0.23	4.5-6.0	Low---------	0.49	3	.5-2
	24-36	10-32	1.40-1.80	0.06-0.2	0.09-0.12	4.5-6.0	Moderate----	0.43		
	36-60	16-32	1.45-1.80	0.06-0.2	0.09-0.12	5.1-6.5	Low---------	0.43		
Cy--------------- Calloway	0-29	10-30	1.40-1.55	0.6-2.0	0.20-0.23	4.5-6.0	Low---------	0.49	3	.5-2
	29-40	10-32	1.40-1.80	0.06-0.2	0.09-0.12	4.5-6.0	Moderate----	0.43		
	40-64	16-32	1.45-1.80	0.06-0.2	0.09-0.12	5.1-6.5	Low---------	0.43		
De--------------- Dundee	0-4	10-30	1.30-1.80	0.6-2.0	0.15-0.20	4.5-6.0	Low---------	0.43	5	.5-1
	4-49	18-34	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate----	0.32		
	49-60	18-25	1.30-1.80	0.6-2.0	0.15-0.20	4.5-7.3	Low---------	0.32		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Dh----------------- Dundee	0-4	10-30	1.30-1.80	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.43	5	.5-1
	4-48	18-34	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate-----	0.32		
	48-60	18-25	1.30-1.80	0.6-2.0	0.15-0.20	4.5-7.3	Low----------	0.32		
Dn----------------- Dundee	0-5	10-30	1.30-1.80	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.43	5	.5-1
	5-40	18-34	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate-----	0.32		
	40-60	18-25	1.30-1.80	0.6-2.0	0.15-0.20	4.5-7.3	Low----------	0.32		
Ds: Dundee-----------	0-4	10-30	1.30-1.80	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.43	5	.5-2
	4-57	18-34	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate-----	0.32		
	57-60	18-25	1.30-1.80	0.6-2.0	0.15-0.20	4.5-7.3	Low----------	0.32		
Alligator--------	0-6	40-60	1.20-1.50	<0.06	0.18-0.20	4.5-5.5	High---------	0.32	5	1-3
	6-46	60-85	1.20-1.55	<0.06	0.14-0.18	4.5-5.5	Very high	0.24		
	46-60	35-85	1.20-1.55	<0.06	0.14-0.18	6.1-7.3	Very high	0.24		
Fa----------------- Fausse	0-8	40-95	0.80-1.45	<0.06	0.18-0.20	5.6-7.3	Very high	0.20	5	2-15
	8-47	40-95	0.80-1.45	<0.06	0.18-0.20	5.6-7.3	Very high	0.24		
	47-60	60-95	1.10-1.45	<0.06	0.18-0.20	6.1-8.4	Very high	0.24		
Fd----------------- Forestdale	0-5	27-38	1.30-1.55	0.2-0.6	0.20-0.22	4.5-6.0	Moderate-----	0.37	5	---
	5-24	35-60	1.30-1.60	<0.06	0.14-0.18	4.5-6.0	High---------	0.28		
	24-60	10-35	1.30-1.55	0.2-0.6	0.17-0.22	4.5-7.3	Moderate-----	0.37		
Fo----------------- Forestdale	0-7	27-38	1.30-1.55	0.2-0.6	0.20-0.22	4.5-6.0	Moderate-----	0.37	5	---
	7-30	35-60	1.30-1.55	<0.06	0.14-0.18	4.5-6.0	High---------	0.28		
	30-62	10-35	1.30-1.55	0.2-0.6	0.17-0.22	4.5-7.3	Moderate-----	0.37		
Gt----------------- Guyton	0-16	7-25	1.35-1.65	0.6-2.0	0.20-0.23	3.6-6.0	Low----------	0.43	5	<2
	16-39	20-35	1.35-1.70	0.06-0.2	0.15-0.22	3.6-6.0	Low----------	0.37		
	39-60	20-35	1.35-1.70	0.06-2.0	0.15-0.22	3.6-6.0	Low----------	0.37		
Gy----------------- Guyton	0-28	7-25	1.35-1.65	0.6-2.0	0.20-0.23	3.6-6.0	Low----------	0.43	5	<2
	28-55	20-35	1.35-1.70	0.06-0.2	0.15-0.22	3.6-6.0	Low----------	0.37		
	55-70	20-35	1.35-1.70	0.06-2.0	0.15-0.22	3.6-6.0	Low----------	0.37		
Hb----------------- Hebert	0-9	10-27	1.30-1.65	0.6-2.0	0.21-0.23	4.5-6.0	Low----------	0.43	5	.5-4
	9-48	14-35	1.30-1.80	0.2-0.6	0.18-0.22	4.5-6.5	Moderate-----	0.32		
	48-65	10-35	1.30-1.80	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37		
He----------------- Hebert	0-5	27-35	1.40-1.80	0.2-0.6	0.20-0.22	5.1-6.0	Moderate-----	0.37	5	.5-4
	5-40	14-35	1.30-1.80	0.2-0.6	0.18-0.22	4.5-6.5	Moderate-----	0.32		
	40-60	10-35	1.30-1.80	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37		
Hh----------------- Hebert	0-4	10-27	1.30-1.65	0.6-2.0	0.21-0.23	5.1-6.0	Low----------	0.43	5	.5-4
	4-53	14-35	1.30-1.80	0.2-0.6	0.18-0.22	4.5-6.5	Moderate-----	0.32		
	53-60	10-35	1.30-1.80	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37		
Lo----------------- Loring	0-6	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49	3	.5-2
	6-30	18-35	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43		
	30-52	12-25	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low----------	0.43		
	52-60	10-25	1.30-1.60	0.2-2.0	0.06-0.13	4.5-6.5	Low----------	0.43		
Lr----------------- Loring	0-7	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49	3	.5-2
	7-29	18-35	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43		
	29-60	12-25	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low----------	0.43		
	50-65	10-25	1.30-1.60	0.2-2.0	0.06-0.13	4.5-6.5	Low----------	0.43		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Me---------------- Memphis	0-5	8-22	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49	5	1-2
	5-44	20-35	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.49		
	44-71	12-30	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49		
Mh---------------- Memphis	0-5	8-22	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49	5	1-2
	5-19	20-35	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.49		
	19-64	12-30	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49		
Mm---------------- Memphis	0-5	8-22	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49	5	1-2
	5-37	20-35	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.49		
	37-60	12-30	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49		
MP:										
Memphis----------	0-3	8-22	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49	5	1-2
	3-20	20-35	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.49		
	20-70	12-30	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49		
Kisatchie--------	0-6	10-27	1.35-1.65	0.6-2.0	0.12-0.20	4.5-5.5	Low----------	0.43	3	.5-2
	6-27	35-55	1.20-1.70	<0.06	0.15-0.18	3.6-5.0	High---------	0.32		
	27-34	27-55	1.20-1.70	<0.06	0.10-0.15	3.6-5.0	High---------	0.32		
	34-60	---	---	---	---	---	-------------	----		
Oula-------------	0-2	27-50	1.30-1.70	0.06-0.2	0.15-0.20	4.5-6.0	High---------	0.32	5	.5-2
	2-28	35-60	1.25-1.70	<0.06	0.15-0.18	3.6-5.5	High---------	0.32		
	28-60	20-60	1.20-1.70	<0.06	0.10-0.18	3.6-5.5	High---------	0.32		
MS:										
Memphis----------	0-2	8-22	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49	5	1-2
	2-23	20-35	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.49		
	23-62	12-30	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49		
Smithdale--------	0-12	2-15	1.40-1.50	2.0-6.0	0.14-0.16	4.5-5.5	Low----------	0.28	5	.5-2
	12-38	18-33	1.40-1.55	0.6-2.0	0.15-0.17	4.5-5.5	Low----------	0.24		
	38-60	12-33	1.40-1.55	2.0-6.0	0.14-0.16	4.5-5.5	Low----------	0.28		
Mt---------------- Moreland	0-12	39-50	1.20-1.50	<0.06	0.18-0.20	6.1-7.8	Very high	0.32	5	2-4
	12-46	39-60	1.20-1.45	<0.06	0.18-0.20	6.6-8.4	Very high	0.32		
	46-67	35-60	1.20-1.75	<0.2	0.18-0.21	6.6-8.4	Very high	0.32		
Ne---------------- Necessity	0-5	5-15	1.32-1.65	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.49	5	.5-3
	5-27	18-32	1.40-1.80	0.06-0.2	0.15-0.20	4.5-6.0	Low----------	0.37		
	27-80	18-30	1.50-1.90	0.06-0.2	0.15-0.20	4.5-6.0	Low----------	0.37		
No---------------- Norwood	0-9	10-27	1.35-1.65	0.6-2.0	0.17-0.21	7.4-8.4	Low----------	0.43	5	.5-2
	9-17	18-35	1.35-1.65	0.6-2.0	0.15-0.22	7.4-8.4	Low----------	0.43		
	17-60	10-35	1.35-1.65	0.6-2.0	0.15-0.22	7.9-8.4	Low----------	0.43		
OA:										
Oula-------------	0-2	27-50	1.30-1.70	0.06-0.2	0.15-0.20	4.5-6.0	High---------	0.32	5	0-3
	2-43	35-60	1.25-1.70	<0.06	0.15-0.18	3.6-5.5	High---------	0.32		
	43-60	20-60	1.20-1.70	<0.06	0.10-0.18	3.6-5.5	High---------	0.32		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
OA:										
Providence------	0-7	5-12	1.30-1.40	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.49	3	.5-3
	7-27	18-30	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.43		
	27-36	20-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Moderate----	0.32		
	36-47	12-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Low---------	0.32		
	47-60	10-30	1.40-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low---------	0.32		
Smithdale-------	0-4	2-15	1.40-1.50	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28	5	.5-2
	4-19	18-33	1.40-1.55	0.6-2.0	0.15-0.17	4.5-5.5	Low---------	0.24		
	19-60	12-33	1.40-1.55	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28		
OP:										
Oula------------	0-3	10-27	1.35-1.65	0.2-2.0	0.12-0.25	4.5-6.0	Low---------	0.43	5	.5-2
	3-37	35-60	1.25-1.70	<0.06	0.15-0.18	3.6-5.5	High--------	0.32		
	37-60	20-60	1.20-1.70	<0.06	0.10-0.18	3.6-5.5	High--------	0.32		
Providence------	0-7	5-12	1.30-1.40	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.49	3	.5-3
	7-27	18-30	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.43		
	27-33	20-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Moderate----	0.32		
	33-43	12-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Low---------	0.32		
	43-60	10-30	1.40-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low---------	0.32		
Pa--------------- Perry	0-4	27-49	1.35-1.70	0.06-0.2	0.18-0.22	4.5-6.0	High--------	0.32	5	.5-4
	4-31	55-85	1.17-1.50	<0.06	0.17-0.20	4.5-7.3	Very high	0.28		
	31-60	55-85	1.17-1.50	<0.06	0.17-0.20	6.1-8.4	Very high	0.28		
Pd--------------- Perry	0-5	40-80	1.20-1.60	<0.06	0.17-0.20	4.5-6.0	High--------	0.32	5	.5-4
	5-25	55-85	1.17-1.50	<0.06	0.17-0.20	4.5-7.3	Very high	0.28		
	25-60	55-85	1.17-1.50	<0.06	0.17-0.20	6.1-8.4	Very high	0.28		
Pe--------------- Perry	0-8	40-80	1.20-1.60	<0.06	0.17-0.20	4.5-6.0	High--------	0.32	5	.5-4
	8-26	55-85	1.17-1.50	<0.06	0.17-0.20	4.5-7.3	Very high	0.28		
	26-60	55-85	1.17-1.50	<0.06	0.17-0.20	6.1-8.4	Very high	0.28		
Pg. Pits										
Pr--------------- Providence	0-7	5-12	1.30-1.40	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.49	3	.5-3
	7-25	18-30	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.43		
	25-33	20-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Moderate----	0.32		
	33-43	12-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Low---------	0.32		
	43-60	10-30	1.40-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low---------	0.32		
Ra--------------- Rilla	0-6	14-27	1.30-1.80	0.6-2.0	0.21-0.23	4.5-6.0	Low---------	0.43	5	.5-4
	6-41	18-35	1.30-1.80	0.6-2.0	0.20-0.22	3.6-5.5	Moderate----	0.32		
	41-60	20-50	1.20-1.80	0.6-2.0	0.18-0.22	4.5-7.3	Low---------	0.32		
Rn--------------- Roxana	0-6	5-27	1.35-1.80	0.6-2.0	0.10-0.21	6.6-8.4	Low---------	0.43	5	.5-2
	6-67	10-18	1.35-1.80	0.6-2.0	0.10-0.19	6.6-8.4	Low---------	0.37		
Rp--------------- Roxana	0-5	5-27	1.35-1.80	0.6-2.0	0.10-0.21	6.6-8.4	Low---------	0.43	5	.5-2
	5-88	10-18	1.35-1.80	0.6-2.0	0.10-0.19	6.6-8.4	Low---------	0.37		
Sh--------------- Sharkey	0-4	40-60	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high	0.32	5	.5-4
	4-44	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high	0.28		
	44-60	25-90	1.20-1.75	0.06-0.2	0.12-0.22	6.6-8.4	High--------	0.28		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Sk----------------- Sharkey	0-4	40-60	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high	0.32	5	.5-4
	4-47	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high	0.28		
	47-60	25-90	1.20-1.65	0.06-0.2	0.12-0.18	6.6-8.4	High--------	0.28		
Sm----------------- Sharkey	0-9	40-60	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high	0.32	5	.5-4
	9-49	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high	0.28		
	49-60	25-90	1.20-1.65	0.06-0.2	0.12-0.18	6.6-8.4	High--------	0.28		
Sn----------------- Sharkey	0-6	40-60	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high	0.32	5	.5-4
	6-40	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high	0.28		
	40-63	25-90	1.20-1.75	0.06-0.2	0.12-0.22	6.6-8.4	High--------	0.28		
SP: Smithdale-------	0-10	2-15	1.40-1.50	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28	5	.5-2
	10-26	18-33	1.40-1.55	0.6-2.0	0.15-0.17	4.5-5.5	Low---------	0.24		
	26-80	12-33	1.40-1.55	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28		
Oula-------------	0-2	10-27	1.35-1.65	0.2-2.0	0.12-0.25	4.5-6.0	Low---------	0.43	5	0-3
	2-43	35-60	1.25-1.70	<0.06	0.15-0.18	3.6-5.5	High--------	0.32		
	43-66	20-60	1.20-1.70	<0.06	0.10-0.18	3.6-5.5	High--------	0.32		
Providence------	0-6	5-12	1.30-1.40	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.49	3	.5-3
	6-30	18-30	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.43		
	30-40	20-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Moderate----	0.32		
	40-51	12-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Low---------	0.32		
	51-60	10-30	1.40-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low---------	0.32		
SR: Smithdale-------	0-5	2-15	1.40-1.50	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28	5	.5-2
	5-26	18-33	1.40-1.55	0.6-2.0	0.15-0.17	4.5-5.5	Low---------	0.24		
	26-60	12-33	1.40-1.55	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28		
Lucy-------------	0-30	1-12	1.30-1.70	6.0-20	0.06-0.10	5.1-6.0	Low---------	0.15	5	.5-1
	30-42	10-30	1.40-1.60	2.0-6.0	0.10-0.12	4.5-5.5	Low---------	0.24		
	42-60	15-35	1.40-1.60	0.6-2.0	0.12-0.14	4.5-5.5	Low---------	0.28		
Providence------	0-6	5-12	1.30-1.40	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.49	3	.5-3
	6-24	18-30	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	0.43		
	24-32	20-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Moderate----	0.32		
	32-43	12-30	1.40-1.60	0.2-0.6	0.08-0.10	4.5-6.0	Low---------	0.32		
	43-60	10-30	1.40-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low---------	0.32		
Ss----------------- Sostien	0-4	35-60	1.20-1.35	<0.06	0.18-0.20	6.1-7.3	Very high	0.24	5	1-3
	4-60	35-60	1.20-1.65	<0.06	0.18-0.20	6.1-7.3	Very high	0.24		
St----------------- Sterlington	0-7	10-18	1.30-1.65	0.6-2.0	0.18-0.22	4.5-6.0	Low---------	0.43	5	.5-4
	7-54	10-18	1.30-1.70	0.6-2.0	0.18-0.22	4.5-6.5	Low---------	0.37		
	54-66	10-22	1.30-1.70	0.6-2.0	0.18-0.22	4.5-8.4	Low---------	0.37		
SW: Sweatman--------	0-4	5-20	1.40-1.50	0.6-2.0	0.20-0.22	4.5-5.5	Low---------	0.37	3	.5-1
	4-25	35-55	1.45-1.55	0.2-0.6	0.16-0.20	4.5-5.5	Moderate----	0.28		
	25-62	15-55	1.20-1.65	0.2-0.6	0.10-0.18	4.5-5.5	Moderate----	0.28		
Smithdale-------	0-4	2-15	1.40-1.50	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28	5	.5-2
	4-14	18-33	1.40-1.55	0.6-2.0	0.15-0.17	4.5-5.5	Low---------	0.24		
	14-70	12-33	1.40-1.55	2.0-6.0	0.14-0.16	4.5-5.5	Low---------	0.28		
Ta----------------- Tensas	0-3	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High--------	0.32	5	.5-4
	3-24	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	Very high	0.32		
	24-60	10-39	1.30-1.80	0.2-2.0	0.20-0.23	5.1-6.5	Low---------	0.37		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Te------------- Tensas	0-5	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High--------	0.32	5	.5-4
	5-22	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	Very high	0.32		
	22-60	10-39	1.30-1.80	0.2-2.0	0.20-0.23	5.1-6.5	Low---------	0.37		
Tn:										
Tensas----------	0-5	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High--------	0.32	5	.5-4
	5-22	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	Very high	0.32		
	22-60	10-39	1.30-1.80	0.2-2.0	0.20-0.23	5.1-6.5	Low---------	0.37		
Alligator-------	0-5	40-60	1.20-1.50	<0.06	0.18-0.20	4.5-5.5	High--------	0.32	5	1-3
	5-42	60-85	1.20-1.50	<0.06	0.14-0.18	4.5-7.3	Very high	0.24		
	42-60	35-85	1.20-1.50	<0.06	0.14-0.18	6.1-7.3	Very high	0.24		
Ts:										
Tensas----------	0-6	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High--------	0.32	5	.5-4
	6-28	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	Very high	0.32		
	28-60	10-39	1.30-1.80	0.2-2.0	0.20-0.23	5.1-6.5	Low---------	0.37		
Alligator-------	0-4	40-60	1.20-1.50	<0.06	0.18-0.20	4.5-5.5	High--------	0.32	5	1-3
	4-42	60-85	1.20-1.50	<0.06	0.14-0.18	4.5-7.3	Very high	0.24		
	42-60	35-85	1.20-1.50	<0.06	0.14-0.18	6.1-7.3	Very high	0.24		
UD. Udifluvents										

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated. The cropping season in this survey area is considered to be the period from June 1 to November 30]

Map symbol and soil name	Hydro-logic group	Flooding: Frequency in cropping season	Flooding: Duration	Flooding: Frequency on yearly basis	Flooding: Duration	High water table: Depth	High water table: Kind	High water table: Months	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
						Ft				
AA:										
Alaga	A	None	---	None	---	>6.0	---	---	Low	Moderate.
Smithdale	B	None	---	None	---	>6.0	---	---	Low	Moderate.
Lucy	A	None	---	None	---	>6.0	---	---	Low	High.
Ag Alligator	D	Occasional	Brief to long.	Frequent	Brief to very long.	0.5-2.0	Apparent	Jan-Apr	High	Moderate.
At Alligator	D	Frequent	Brief to very long.	Frequent	Brief to very long.	0.5-2.0	Apparent	Jan-Apr	High	Moderate.
Ba Bayoudan	D	None	---	None	---	>6.0	---	---	High	High.
Br, Bs Bursley	D	Rare	---	Occasional	Brief to long.	0.5-3.0	Perched	Dec-Jun	High	Moderate.
Co Calhoun	D	None	---	None	---	0-2.0	Perched	Dec-Apr	High	Moderate.
Cs Calhoun	D	Rare	---	Rare	---	0-2.0	Perched	Dec-Apr	High	Moderate.
Cw Calloway	C	None	---	None	---	1.0-2.0	Perched	Jan-Apr	High	Moderate.
Cy Calloway	C	Rare	---	Rare	---	1.0-2.0	Perched	Jan-Apr	High	Moderate.
De, Dh, Dn Dundee	C	Rare	---	Rare	---	1.5-3.5	Apparent	Jan-Apr	High	Moderate.
Ds:										
Dundee	C	Rare	---	Occasional	Brief to long.	1.5-3.5	Apparent	Jan-Apr	High	Moderate.
Alligator	D	Rare	---	Occasional	Brief to long.	0.5-2.0	Apparent	Jan-Apr	High	Moderate.
Fa Fausse	D	Frequent	Long to very long.	Frequent	Long to very long.	+1.-1.5	Apparent	Jan-Dec	High	Low.
Fd Forestdale	D	Rare	---	Occasional	Brief to long.	0.5-2.0	Apparent	Jan-Apr	High	Moderate.
Fo Forestdale	D	Occasional	Brief to long.	Occasional	Brief to very long.	0.5-2.0	Apparent	Jan-Apr	High	Moderate.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency in cropping season	Flooding: Duration	Flooding: Frequency on yearly basis	Flooding: Duration	High water table: Depth	High water table: Kind	High water table: Months	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
						Ft				
Gt------------- Guyton	D	Rare--------	---	Rare--------	---	0-1.5	Perched	Dec-May	High-----	Moderate.
Gy------------- Guyton	D	Frequent---	Very brief to long.	Frequent---	Brief to very long.	0-1.5	Perched	Dec-May	High-----	Moderate.
Hb, He--------- Hebert	C	Rare--------	---	Occasional	Brief to long.	1.5-3.0	Apparent	Dec-Apr	High-----	Moderate.
Hh------------- Hebert	C	Occasional	Brief to long.	Frequent---	Brief to very long.	1.5-3.0	Apparent	Dec-Apr	High-----	Moderate.
Lo------------- Loring	C	None--------	---	None--------	---	2.0-3.0	Perched	Dec-Mar	Moderate	Moderate.
Lr------------- Loring	C	Rare--------	---	Rare--------	---	2.0-3.0	Perched	Dec-Mar	Moderate	Moderate.
Me, Mh, Mm----- Memphis	B	None--------	---	None--------	---	>6.0	---	---	Moderate	Moderate.
MP:										
Memphis--------	B	None--------	---	None--------	---	>6.0	---	---	Moderate	Moderate.
Kisatchie------	D	None--------	---	None--------	---	>6.0	---	---	High-----	High.
Oula-----------	D	None--------	---	None--------	---	>6.0	---	---	High-----	High.
MS:										
Memphis--------	B	None--------	---	None--------	---	>6.0	---	---	Moderate	Moderate.
Smithdale------	B	None--------	---	None--------	---	>6.0	---	---	Low------	Moderate.
Mt------------- Moreland	D	Rare--------	---	Occasional	Brief to long.	0-1.5	Perched	Dec-Apr	High-----	Low.
Ne------------- Necessity	C	Rare--------	---	Occasional	Very breif to long.	1.0-2.0	Perched	Dec-Mar	High-----	Moderate.
No------------- Norwood	B	Rare--------	---	Rare--------	---	>6.0	---	---	High-----	Low.
OA:										
Oula-----------	D	None--------	---	None--------	---	>6.0	---	---	High-----	High.
Providence-----	C	None--------	---	None--------	---	1.5-3.0	Perched	Jan-Mar	Moderate	Moderate.
Smithdale------	B	None--------	---	None--------	---	>6.0	---	---	Low------	Moderate.
OP:										
Oula-----------	D	None--------	---	None--------	---	>6.0	---	---	High-----	High.
Providence-----	C	None--------	---	None--------	---	1.5-3.0	Perched	Jan-Mar	Moderate	Moderate.
Pa------------- Perry	D	Rare--------	---	Occasional	Brief to very long.	0-2.0	Apparent	Dec-Apr	High-----	Moderate.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency in cropping season	Flooding: Duration	Flooding: Frequency on yearly basis	Flooding: Duration	High water table: Depth	High water table: Kind	High water table: Months	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
						Ft				
Pd: Perry	D	Occasional	Brief to long.	Frequent	Brief to very long.	0-2.0	Apparent	Dec-Apr	High	Moderate.
Pe: Perry	D	Frequent	Brief to very long.	Frequent	Brief to very long.	0-2.0	Apparent	Dec-Apr	High	Moderate.
Pg. Pits										
Pr: Providence	C	None	---	None	---	1.5-3.0	Perched	Jan-Mar	Moderate	Moderate.
Ra: Rilla	B	Rare	---	Rare	---	4.0-6.0	Apparent	Dec-Apr	Moderate	High.
Rn: Roxana	B	Rare	---	Rare	---	4.0-6.0	Apparent	Dec-Apr	Low	Low.
Rp: Roxana	B	Frequent	Brief to long.	Frequent	Brief to very long.	4.0-6.0	Apparent	Dec-Apr	Low	Low.
Sh: Sharkey	D	Rare	---	Occasional	Brief to long.	0-2.0	Apparent	Dec-Apr	High	Low.
Sk: Sharkey	D	Occasional	Brief to long.	Frequent	Brief to very long.	0-2.0	Apparent	Dec-Apr	High	Low.
Sm: Sharkey	D	Frequent	Brief to long.	Frequent	Brief to very long.	0-2.0	Apparent	---	High	Low.
Sn: Sharkey	D	Rare	---	Occasional	Brief to long.	0-2.0	Apparent	---	High	Low.
SP:										
Smithdale	B	None	---	None	---	>6.0	---	---	Low	Moderate.
Oula	D	None	---	None	---	>6.0	---	---	High	High.
Providence	C	None	---	None	---	1.5-3.0	Perched	Jan-Mar	Moderate	Moderate.
SR:										
Smithdale	B	None	---	None	---	>6.0	---	---	Low	Moderate.
Lucy	A	None	---	None	---	>6.0	---	---	Low	High.
Providence	C	None	---	None	---	1.5-3.0	Perched	Jan-Mar	Moderate	Moderate.
Ss: Sostien	D	Occasional	Brief to long.	Frequent	Brief to very long.	0-2.0	Apparent	Dec-Apr	High	Low.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding				High water table			Risk of corrosion	
		Frequency in cropping season	Dura-tion	Frequency on yearly basis	Duration	Depth	Kind	Months	Uncoated steel	Concrete
						Ft				
St------------- Sterlington	B	Rare-------	---	Rare-------	---	>6.0	---	---	Low------	Moderate.
SW:										
Sweatman------	C	None-------	---	None-------	---	>6.0	---	---	High-----	High.
Smithdale-----	B	None-------	---	None-------	---	>6.0	---	---	Low------	Moderate.
Ta------------- Tensas	D	Rare-------	---	Occasional	Brief to long.	1.0-3.0	Apparent	Dec-Apr	High-----	Moderate.
Te------------- Tensas	D	Occasional	Brief to long.	Frequent---	Brief to very long.	1.0-3.0	Apparent	Dec-Apr	High-----	Moderate.
Tn:										
Tensas---------	D	Rare-------	---	Occasional	Brief to long.	1.0-3.0	Apparent	Dec-Apr	High-----	Moderate.
Alligator-----	D	Rare-------	---	Occasional	Brief to very long.	0.5-2.0	Apparent	Jan-Apr	High-----	Moderate.
Ts:										
Tensas---------	D	Occasional	Brief to long.	Frequent---	Brief to very long.	1.0-3.0	Apparent	Dec-Apr	High-----	Moderate.
Alligator-----	D	Occasional	Brief to very long.	Frequent---	Brief to very long.	0.5-2.0	Apparent	Jan-Apr	High-----	Moderate.
UD. Udifluvents										

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Alaga	Thermic, coated Typic Quartzipsamments
*Alligator	Very-fine, montmorillonitic, acid, thermic Vertic Haplaquepts
Bayoudan	Very-fine, montmorillonitic, thermic Aquentic Chromuderts
Bursley	Fine-silty, mixed, thermic Aeric Glossaqualfs
Calhoun	Fine-silty, mixed, thermic Typic Glossaqualfs
Calloway	Fine-silty, mixed, thermic Glossaquic Fragiudalfs
Dundee	Fine-silty, mixed, thermic Aeric Ochraqualfs
*Fausse	Very-fine, montmorillonitic, nonacid, thermic Typic Fluvaquents
*Forestdale	Fine, montmorillonitic, thermic Typic Ochraqualfs
Guyton	Fine-silty, siliceous, thermic Typic Glossaqualfs
*Hebert	Fine-silty, mixed, thermic Aeric Ochraqualfs
Kisatchie	Fine, montmorillonitic, thermic Typic Hapludalfs
Loring	Fine-silty, mixed, thermic Typic Fragiudalfs
Lucy	Loamy, siliceous, thermic Arenic Paleudults
Memphis	Fine-silty, mixed, thermic Typic Hapludalfs
Moreland	Fine, mixed, thermic Vertic Hapludolls
Necessity	Fine-silty, mixed, thermic Glossaquic Fragiudalfs
Norwood	Fine-silty, mixed (calcareous), thermic Typic Udifluvents
Oula	Fine, montmorillonitic, thermic Vertic Hapludalfs
Perry	Very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Providence	Fine-silty, mixed, thermic Typic Fragiudalfs
Rilla	Fine-silty, mixed, thermic Typic Hapludalfs
Roxana	Coarse-silty, mixed, nonacid, thermic Typic Udifluvents
*Sharkey	Very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Smithdale	Fine-loamy, siliceous, thermic Typic Hapludults
Sostien	Fine, montmorillonitic, nonacid, thermic Vertic Fluvaquents
Sterlington	Coarse-silty, mixed, thermic Typic Hapludalfs
Sweatman	Clayey, mixed, thermic Typic Hapludults
Tensas	Fine, montmorillonitic, thermic Vertic Ochraqualfs

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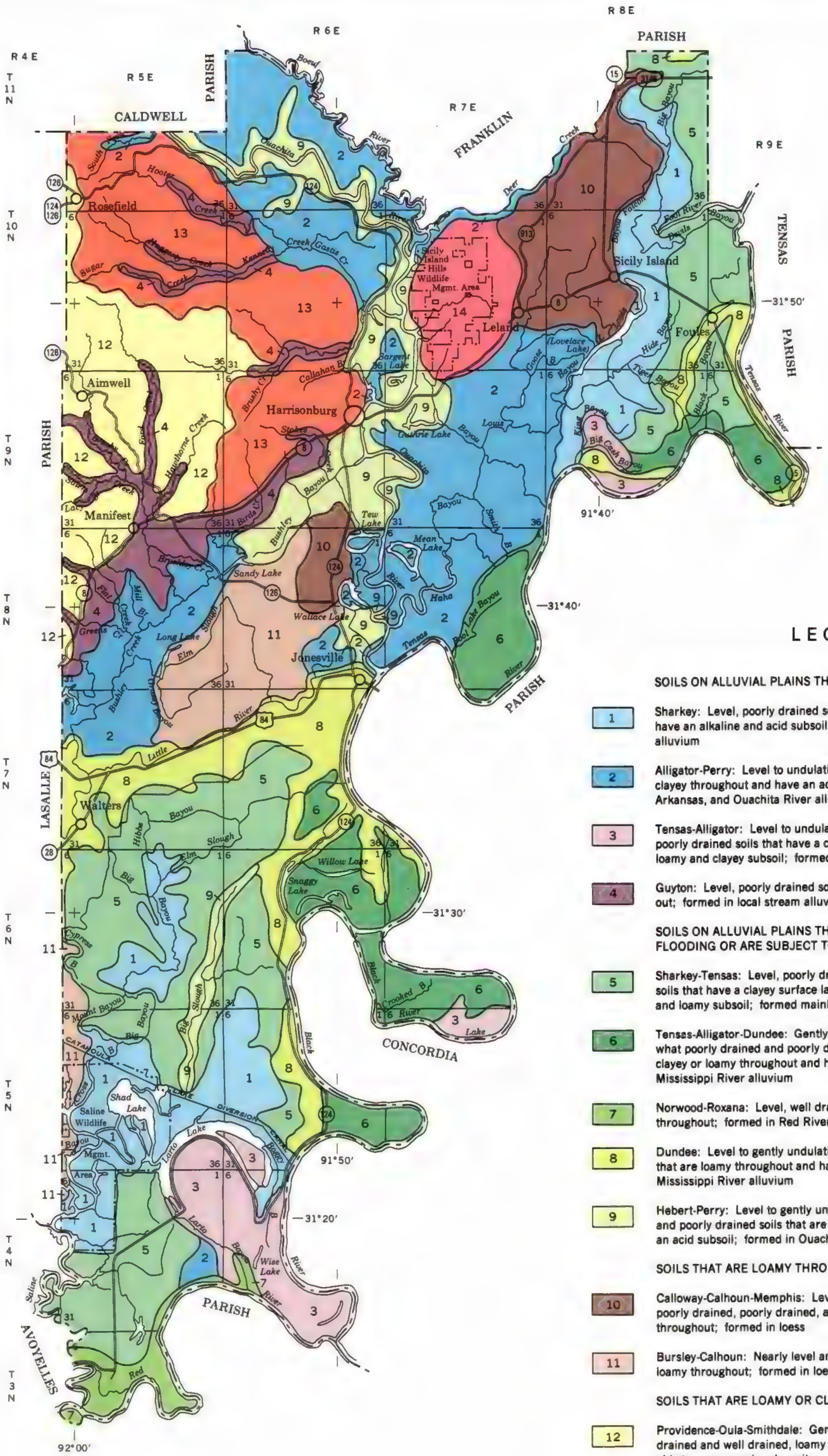


LEGEND

SOILS ON ALLUVIAL PLAINS THAT ARE SUBJECT TO FLOODING

1 — Sharkey: Level, poorly drained soils that are clayey throughout and have an alkaline and acid subsoil; formed in Mississippi River alluvium

2 — Alligator-Perry: Level to undulating, poorly drained soils that are clayey throughout and have an acid subsoil; formed in Mississippi, Arkansas, and Ouachita River alluvium

3 — Tensas-Alligator: Level to undulating, somewhat poorly drained and poorly drained soils that have a clayey surface layer and an acid, loamy and clayey subsoil; formed in Mississippi River alluvium

4 — Guyton: Level, poorly drained soils that are loamy and acid throughout; formed in local stream alluvium

SOILS ON ALLUVIAL PLAINS THAT ARE PROTECTED FROM FLOODING OR ARE SUBJECT TO RARE FLOODING

5 — Sharkey-Tensas: Level, poorly drained and somewhat poorly drained soils that have a clayey surface layer and an alkaline and acid, clayey and loamy subsoil; formed mainly in Mississippi River alluvium

6 — Tensas-Alligator-Dundee: Gently undulating and undulating, somewhat poorly drained and poorly drained soils that are dominantly clayey or loamy throughout and have an acid subsoil; formed in Mississippi River alluvium

7 — Norwood-Roxana: Level, well drained soils that are loamy and alkaline throughout; formed in Red River alluvium

8 — Dundee: Level to gently undulating, somewhat poorly drained soils that are loamy throughout and have an acid subsoil; formed in Mississippi River alluvium

9 — Hebert-Perry: Level to gently undulating, somewhat poorly drained and poorly drained soils that are loamy or clayey throughout and have an acid subsoil; formed in Ouachita and Arkansas River alluvium

SOILS THAT ARE LOAMY THROUGHOUT; ON STREAM TERRACES*

10 — Calloway-Calhoun-Memphis: Level to strongly sloping, somewhat poorly drained, poorly drained, and well drained soils that are loamy throughout; formed in loess

11 — Bursley-Calhoun: Nearly level and level, poorly drained soils that are loamy throughout; formed in loess, alluvium, and old stream deposits

SOILS THAT ARE LOAMY OR CLAYEY; ON UPLANDS*

12 — Providence-Oula-Smithdale: Gently sloping to steep, moderately well drained and well drained, loamy and clayey soils; formed in loess and old stream or marine deposits

13 — Smithdale-Oula-Sweatman: Moderately sloping to steep, well drained, loamy and clayey soils; formed in old stream or marine deposits

14 — Memphis-Smithdale: Moderately sloping to steep, well drained, loamy soils; formed in loess and old stream deposits

*The texture given in the descriptive heading refers to the texture of the surface layer of the major soils in each map unit.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
LOUISIANA AGRICULTURAL EXPERIMENT STATION
LOUISIANA STATE SOIL AND WATER CONSERVATION COMMITTEE

GENERAL SOIL MAP

CATAHOULA PARISH, LOUISIANA

Scale 1:253,440

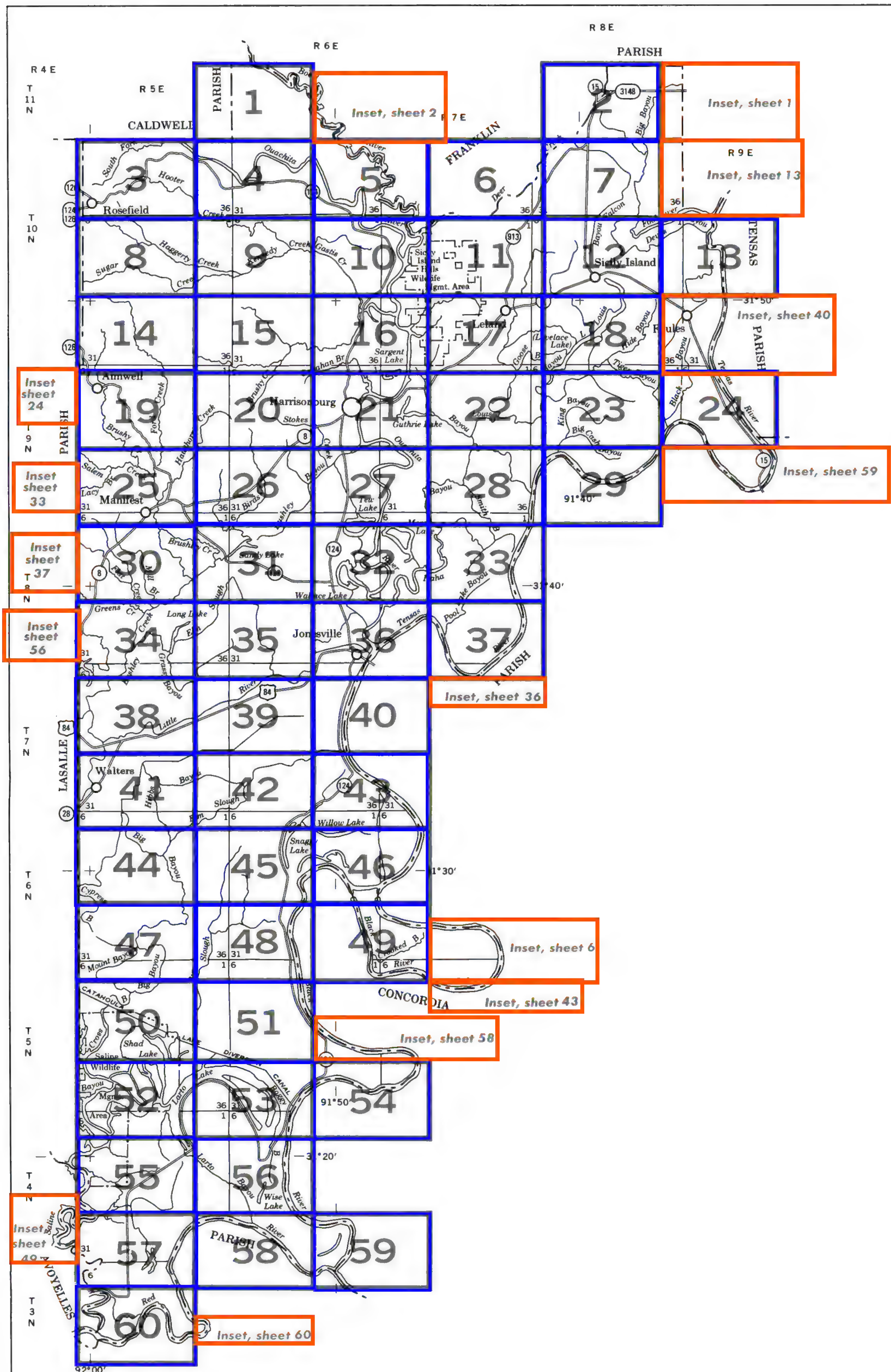
1 0 1 2 3 4 Miles

1 0 4 8 Km

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

CATAHOULA PARISH, LOUISIANA

Scale 1:253,440

1 0 1 2 3 4 Miles

1 0 4 8 Km

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

Soil map symbols and map unit names are alphabetical. Map symbols are letters. The first letter, always a capital, is the initial letter of the soil series name or miscellaneous area. The second letter is a small letter except in Order three map units, in which case it is a capital letter. In addition to having all capital letter symbols, Order three maps are further indicated by the footnote 1/.

SYMBOL	NAME
AA	Alaga-Smithdale Lucy association, 5 to 40 percent slopes 1/
Ag	Alligator clay, occasionally flooded
At	Alligator clay, frequently flooded
Ba	Bayoudan clay, 5 to 40 percent slopes
Br	Bursley silt loam, rarely flooded
Bs	Bursley silty clay loam, rarely flooded
Co	Calhoun silt loam
Cs	Calhoun silt loam, rarely flooded
Cw	Calloway silt loam
Cy	Calloway silt loam, rarely flooded
De	Dundee silt loam, 0 to 1 percent slopes
Dh	Dundee silt loam, gently undulating
Dn	Dundee silty clay loam, 0 to 1 percent slopes
Ds	Dundee-Alligator complex, gently undulating
Fa	Fausse clay
Fd	Forestdale silty clay loam
Fo	Forestdale silty clay loam, occasionally flooded
Gt	Guyton silt loam
Gy	Guyton silt loam, frequently flooded
Hb	Hebert silt loam
He	Hebert silty clay loam
Hh	Hebert silt loam, gently undulating, occasionally flooded
Lo	Loring silt loam
Lr	Loring silt loam, rarely flooded
Me	Memphis silt loam, 0 to 2 percent slopes
Mh	Memphis silt loam, 2 to 5 percent slopes
Mm	Memphis silt loam, 5 to 12 percent slopes
MP	Memphis-Kisatchie-Oula association, 5 to 40 percent slopes 1/
MS	Memphis-Smithdale association, 5 to 40 percent slopes 1/
Mt	Moreland clay
Ne	Necessity silt loam, rarely flooded
No	Norwood silt loam
OA	Oula-Providence-Smithdale association, 5 to 40 percent slopes 1/
OP	Oula-Providence association, 5 to 25 percent slopes 1/
Pa	Perry silty clay loam
Pd	Perry clay, occasionally flooded
Pe	Perry clay, frequently flooded
Pg	Pits, gravel
Pr	Providence silt loam, 1 to 6 percent slopes
Ra	Rilla silt loam
Rn	Roxana very fine sandy loam
Rp	Roxana very fine sandy loam, frequently flooded
Sh	Sharkey clay
Sk	Sharkey clay, occasionally flooded
Sm	Sharkey clay, frequently flooded
Sn	Sharkey clay, overwash
SP	Smithdale-Oula-Providence association, 5 to 40 percent slopes 1/
SR	Smithdale-Lucy-Providence association, 5 to 25 percent slopes 1/
Ss	Sostien clay, occasionally flooded
St	Sterlington silt loam
SW	Sweatman-Smithdale association, 5 to 40 percent slopes 1/
Ta	Tensas silty clay
Te	Tensas silty clay, occasionally flooded
Tn	Tensas-Alligator complex, undulating
Ts	Tensas-Alligator complex, undulating, occasionally flooded
UD	Udifluvents, loamy 1/

1/ Order three map units. Fewer soil examinations were made in these mapping units, and delineations and included areas are generally larger. The mapping units were designed primarily for range and wildlife habitat management or woodland and wildlife habitat management.

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label) — Hedley Airstrip

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 21
- Federal — 173
- State — 28
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water, w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — CnB, WaC2

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

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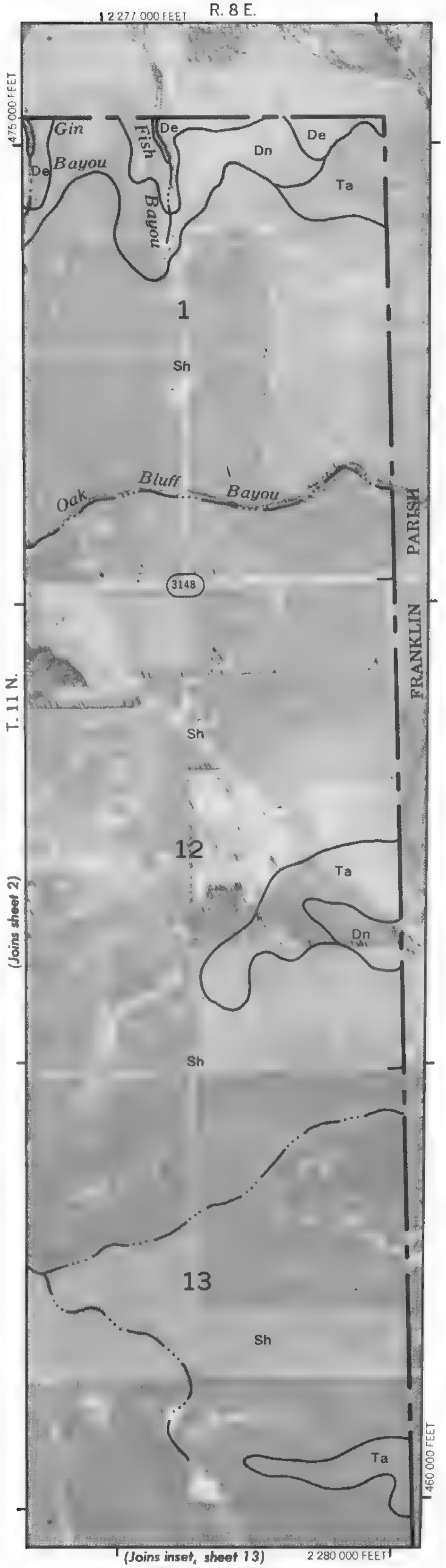

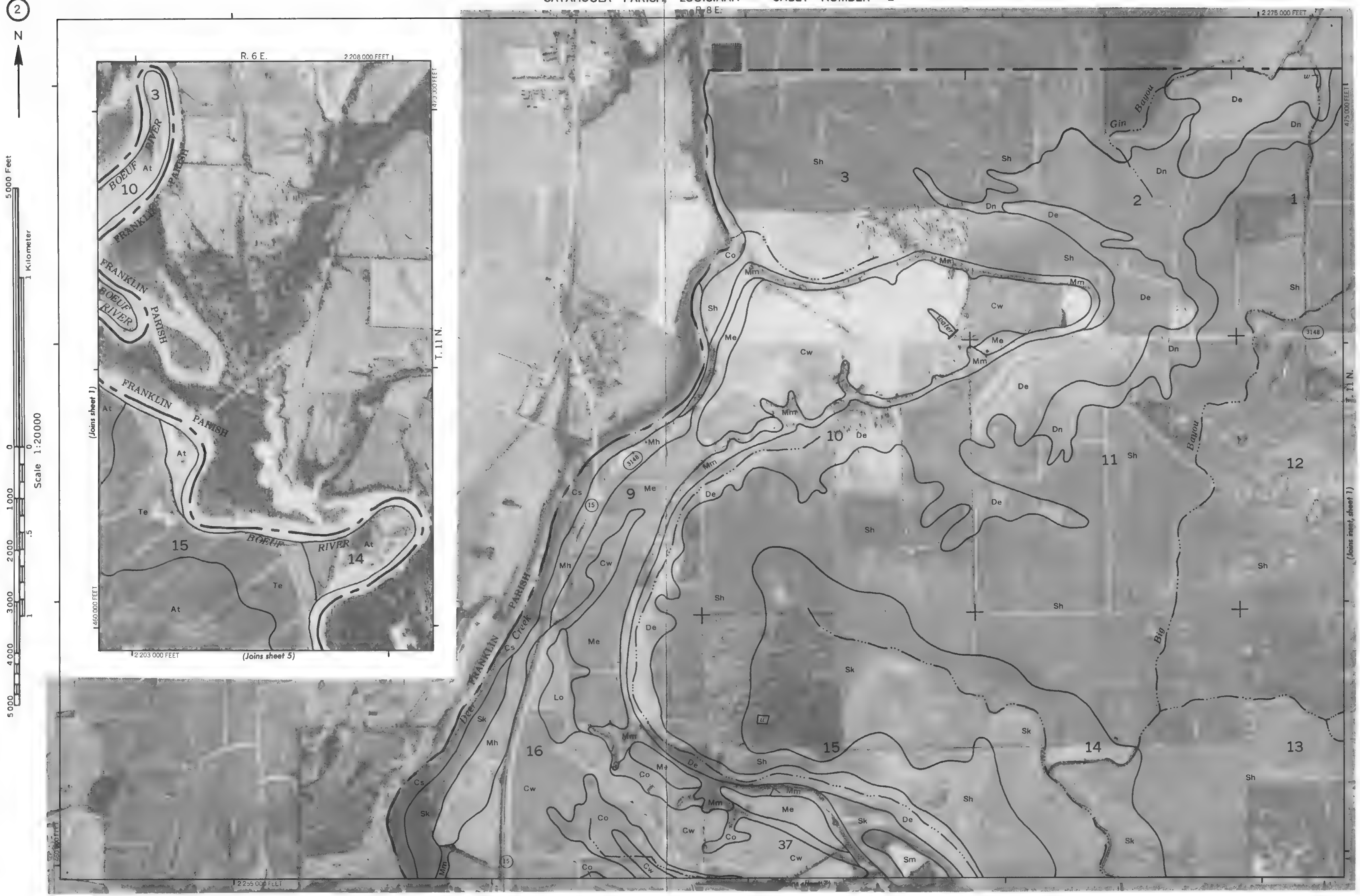

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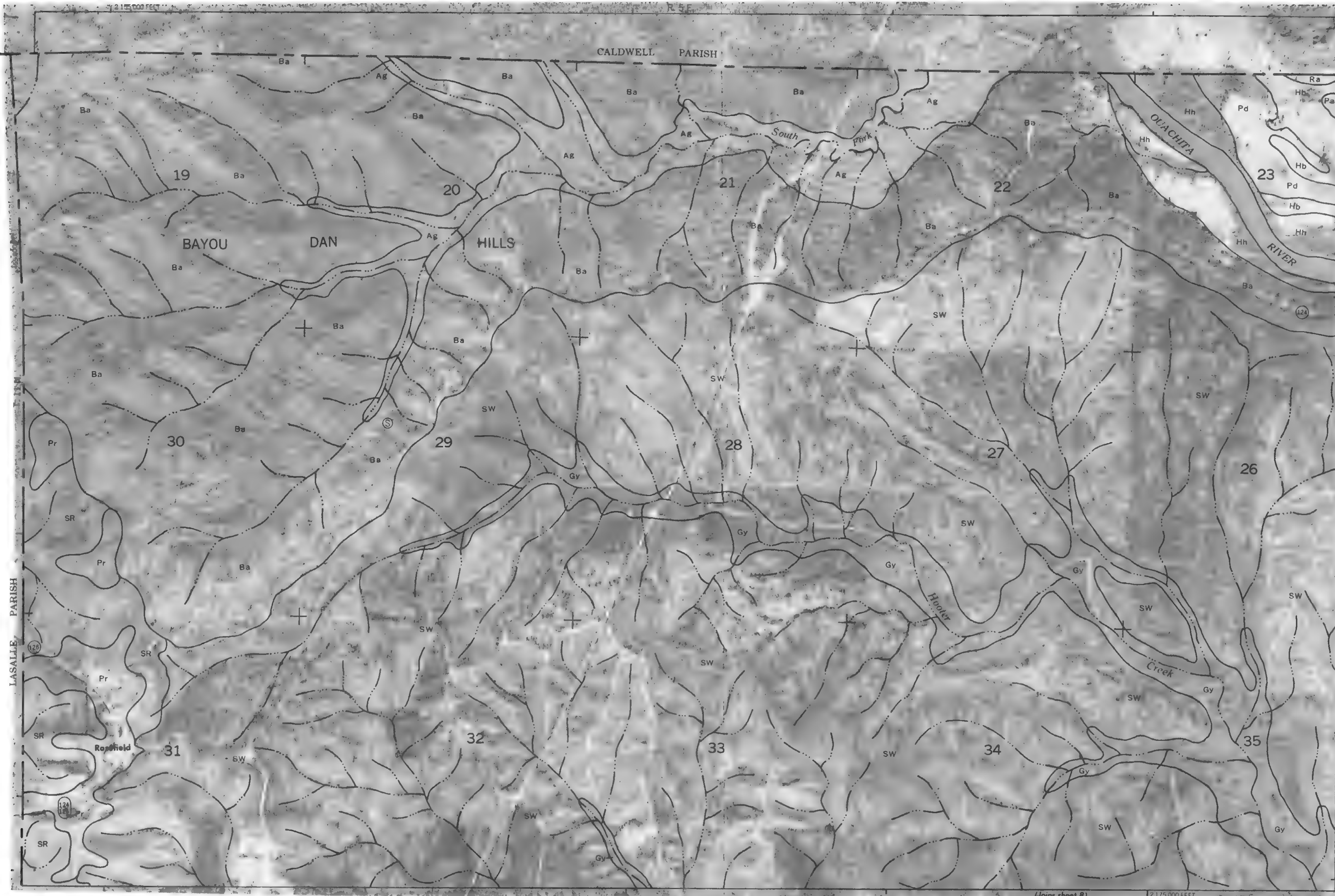
CATAHOULA PARISH, LOUISIANA NO. 2

3



N

Scale 1:20000

1 Kilometer

5 000 Feet

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CATAHOULA PARISH, LOUISIANA NO. 3

CATAHOULA PARISH, LOUISIANA — SHEET NUMBER 4

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CATAHOULA PARISH, LOUISIANA NO. 4

CATAHOULA PARISH, LOUISIANA NO. 5

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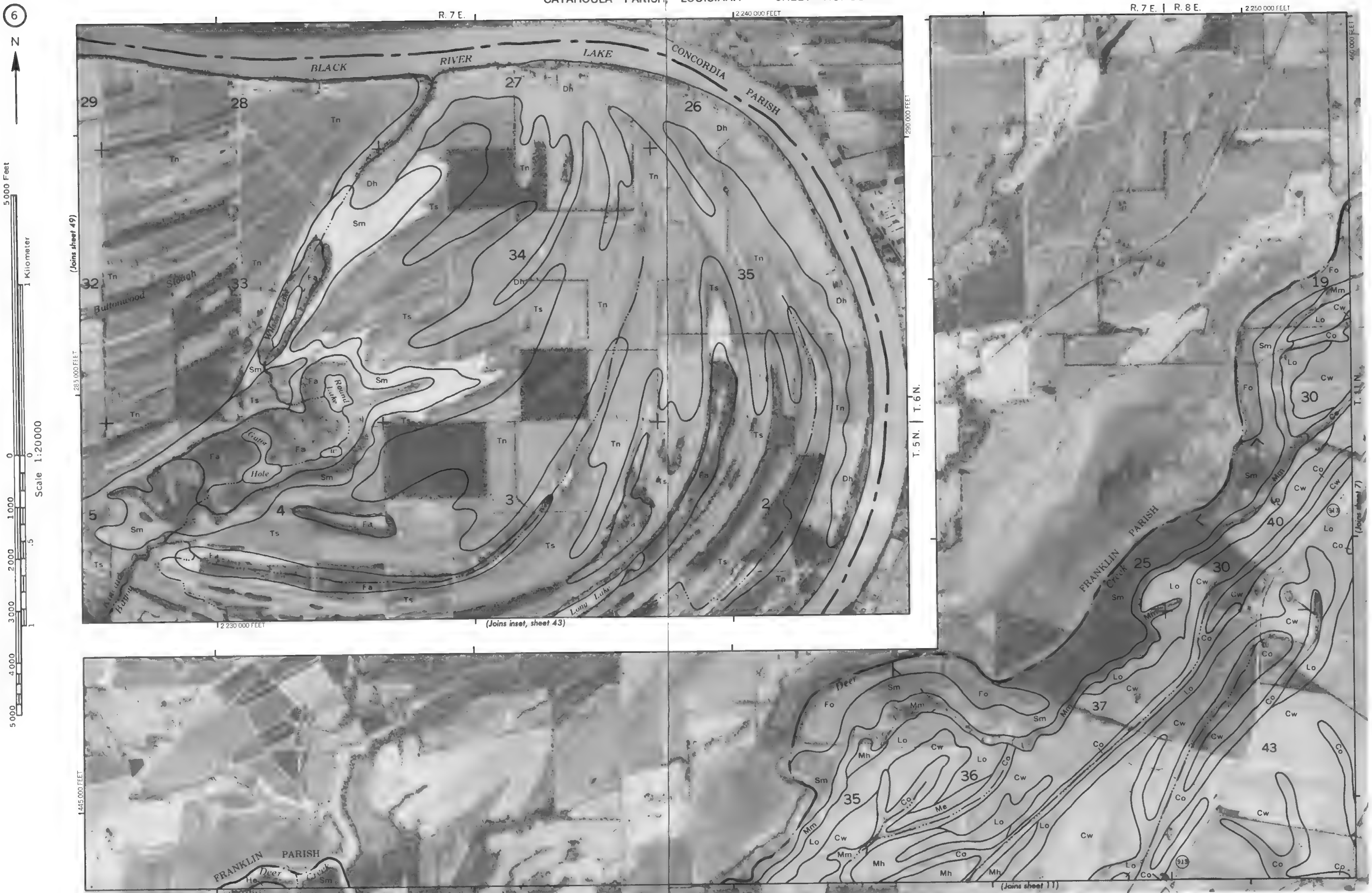
6
N
5000 Feet
1 Kilometer
Scale 1:20000
R. 7 E.
R. 7 E. | R. 8 E.
2 240 000 FEET
2 250 000 FEET
2 230 000 FEET
290 000 FEET
285 000 FEET
445 000 FEET
T. 6 N.
T. 5 N.
T. 11 N.
BLACK RIVER LAKE
CONCORDIA PARISH
FRANKLIN PARISH
Buttonwood Slough
Round Lake
Gator Hole
Long Lake
Deer Creek
(Joins sheet 49)
(Joins inset, sheet 43)
(Joins sheet 7)
(Joins sheet 11)

CATAHOULA PARISH, LOUISIANA NO. 7

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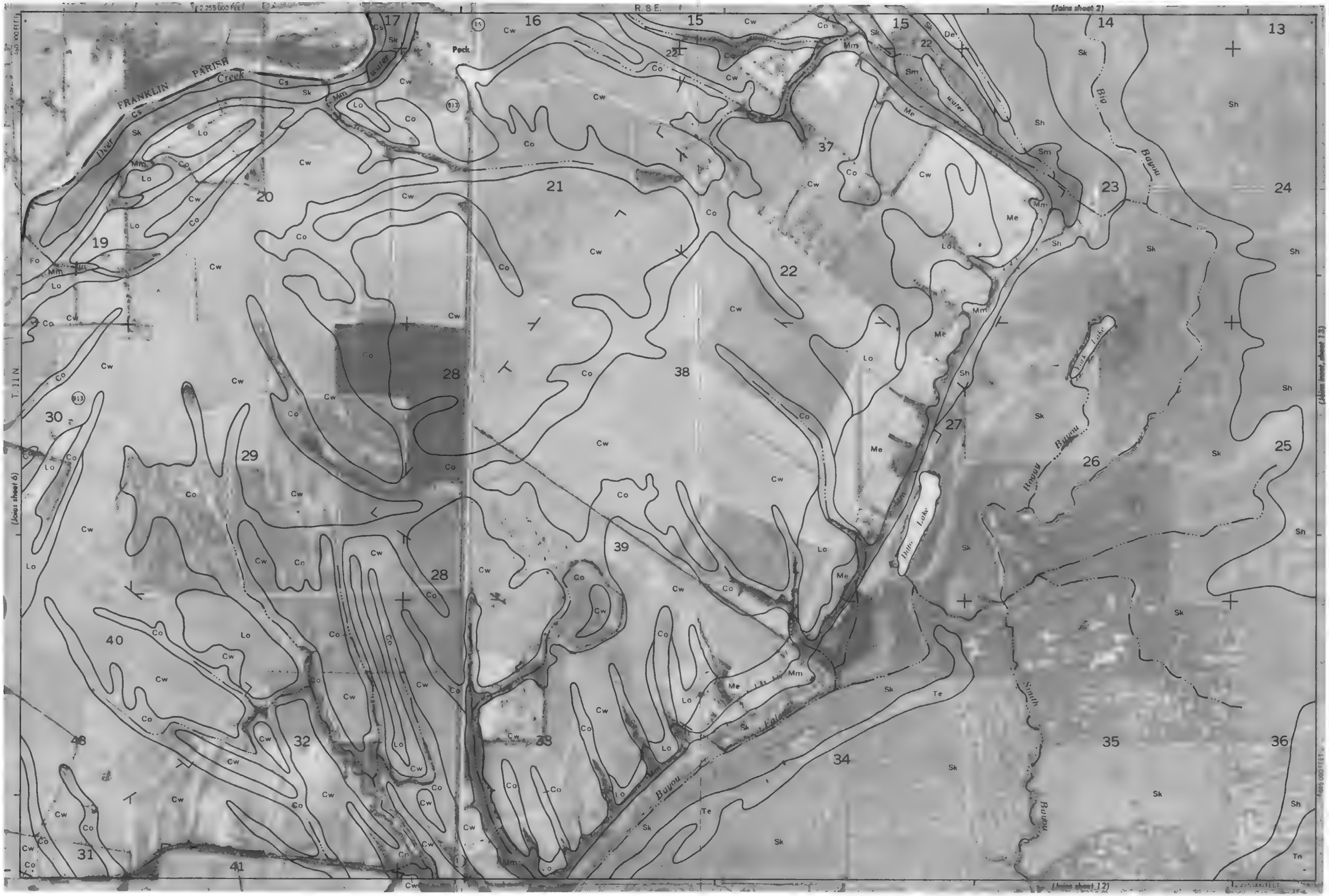

7

N

5000 Feet

1 Kilometer

Scale 1:20000

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CATAHOULA PARISH, LOUISIANA NO. 9

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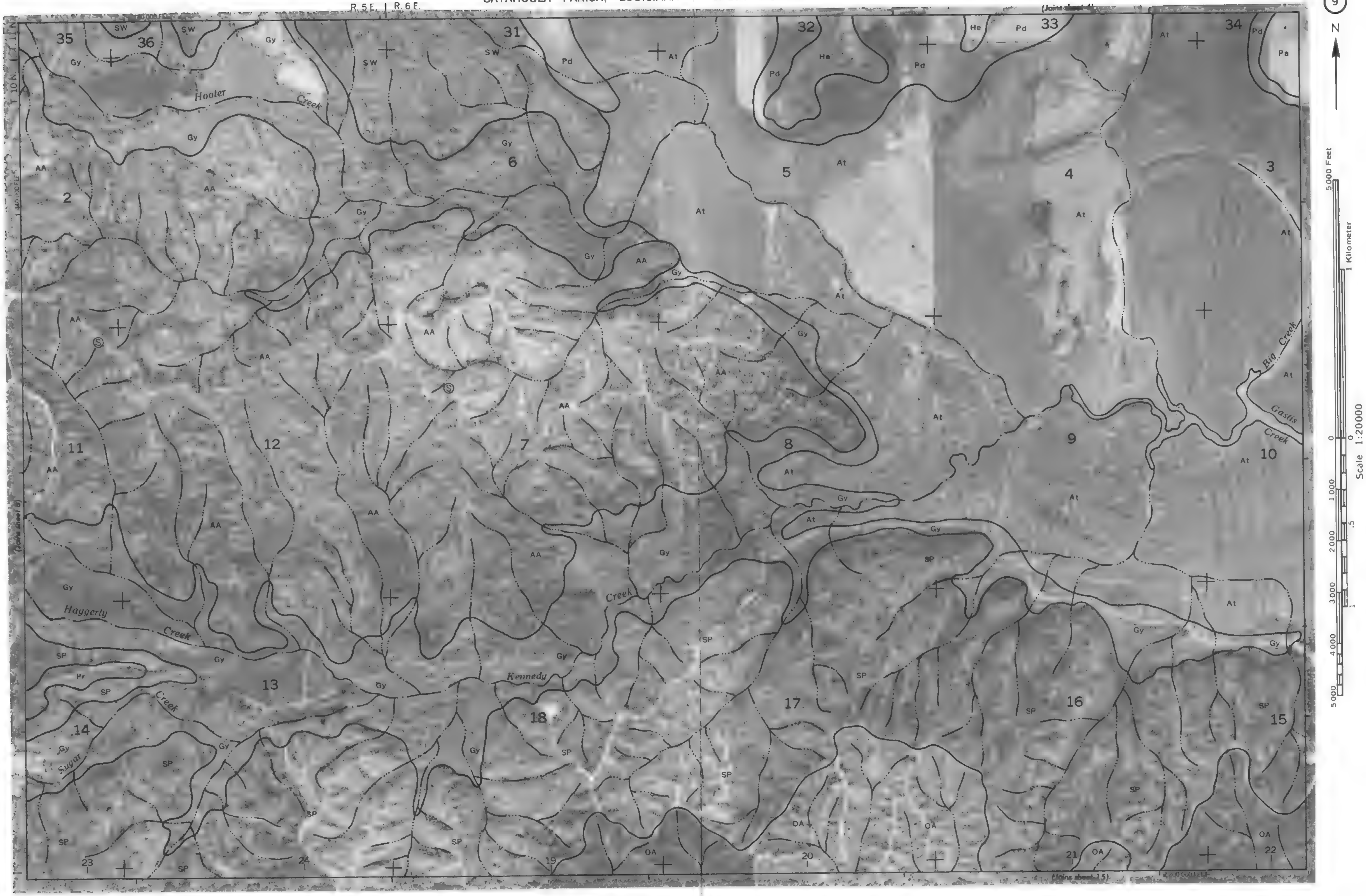

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CATAHOULA PARISH, LOUISIANA NO. 11

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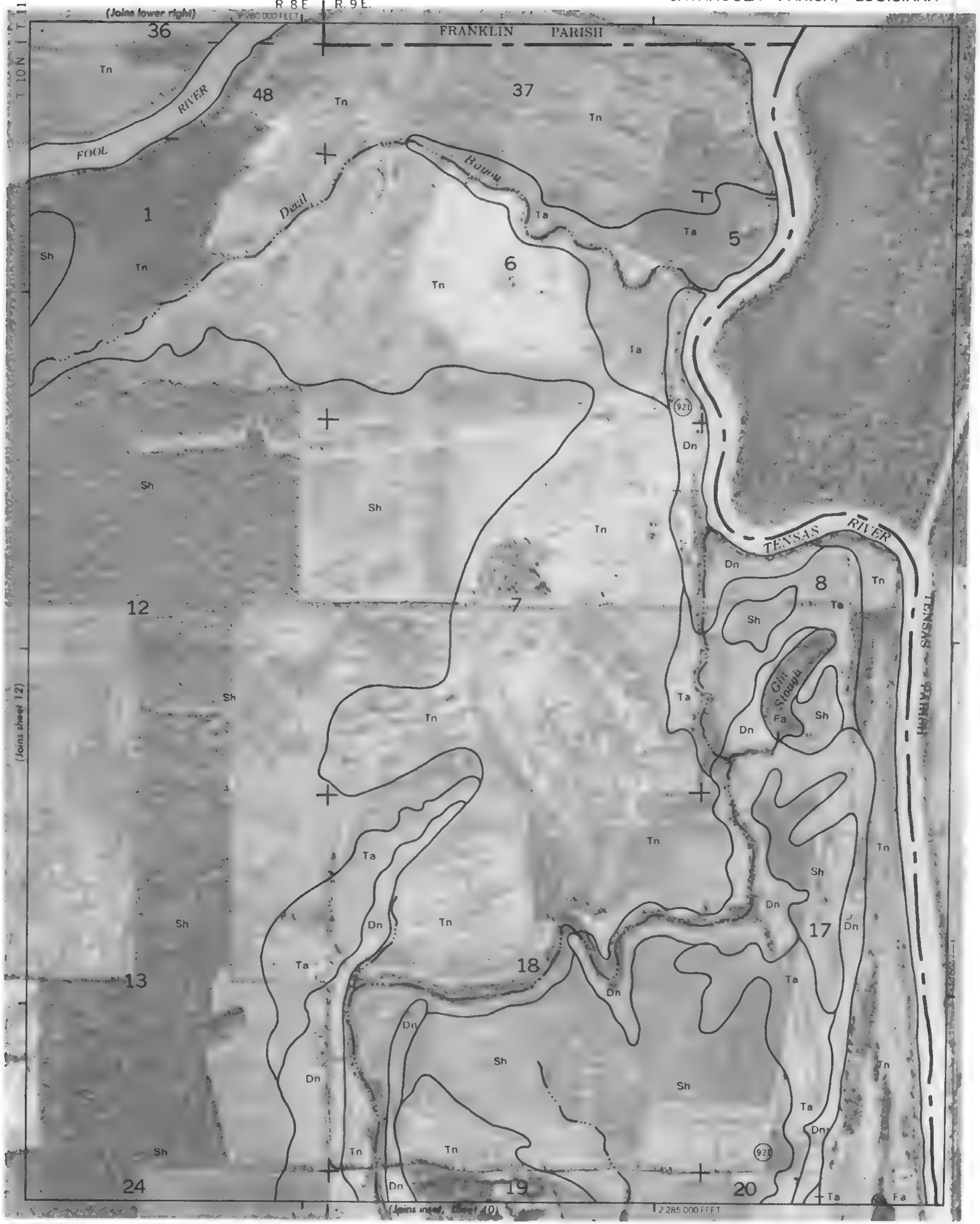
Coordinate grid ticks and land division corners, if shown, are approximately positioned

CATAHOULA PARISH, LOUISIANA NO. 12



13
N
Scale - 1:20000
5000 Feet
1 Kilometer

CATAHOULA PARISH, LOUISIANA NO. 13
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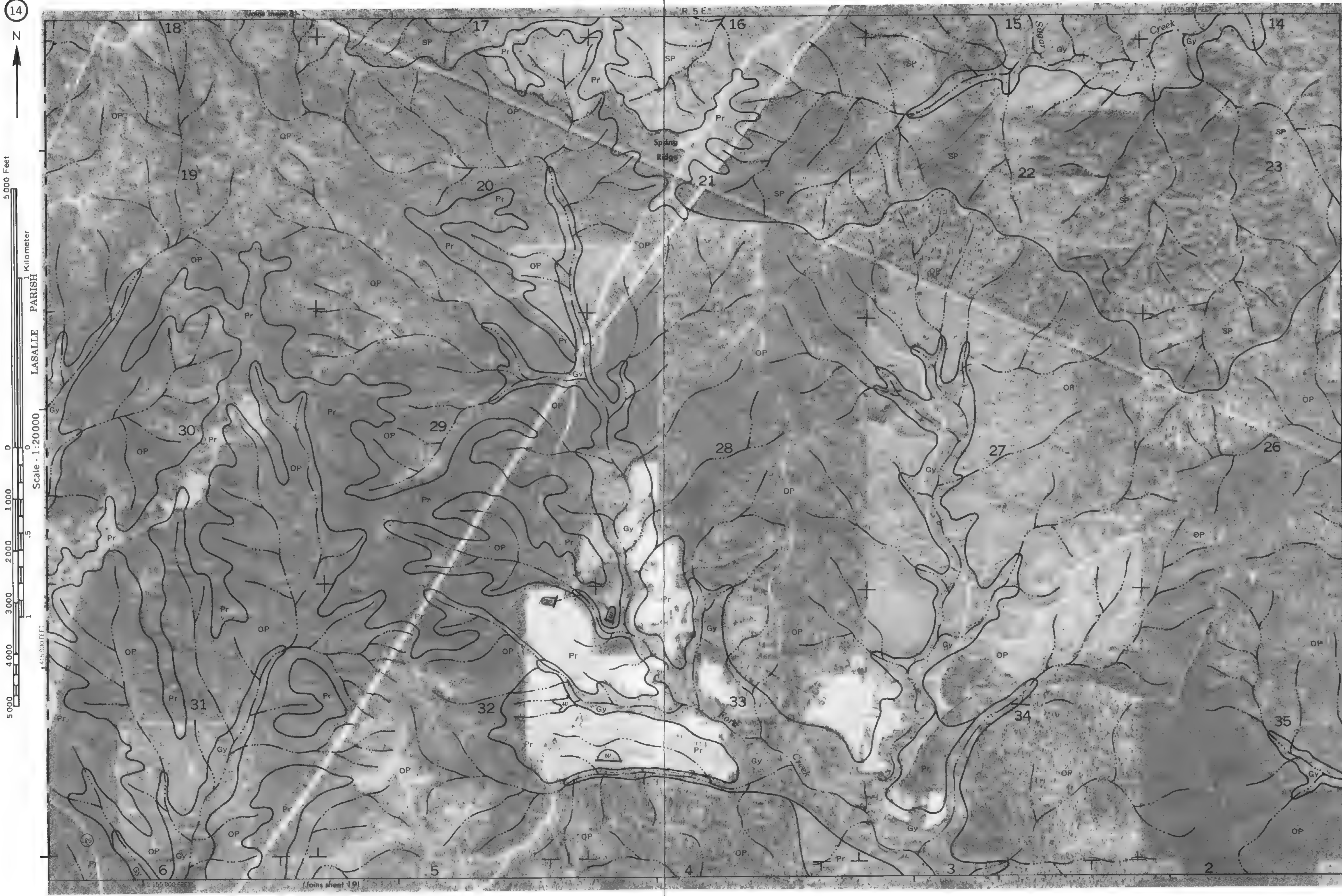
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

15

N

5000 Feet

1 Kilometer

Scale 1:20000

CATAHOULA PARISH, LOUISIANA NO. 15

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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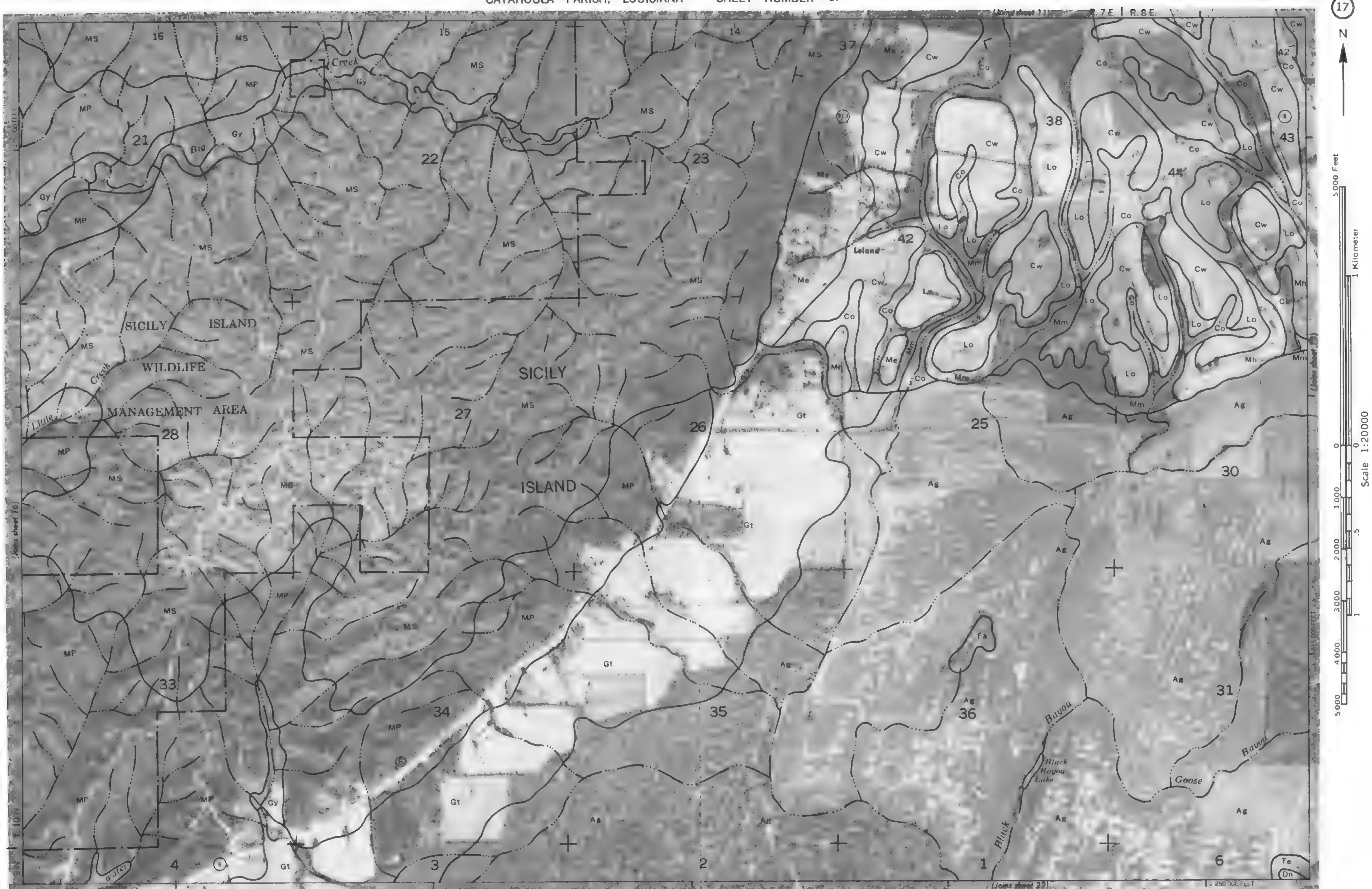
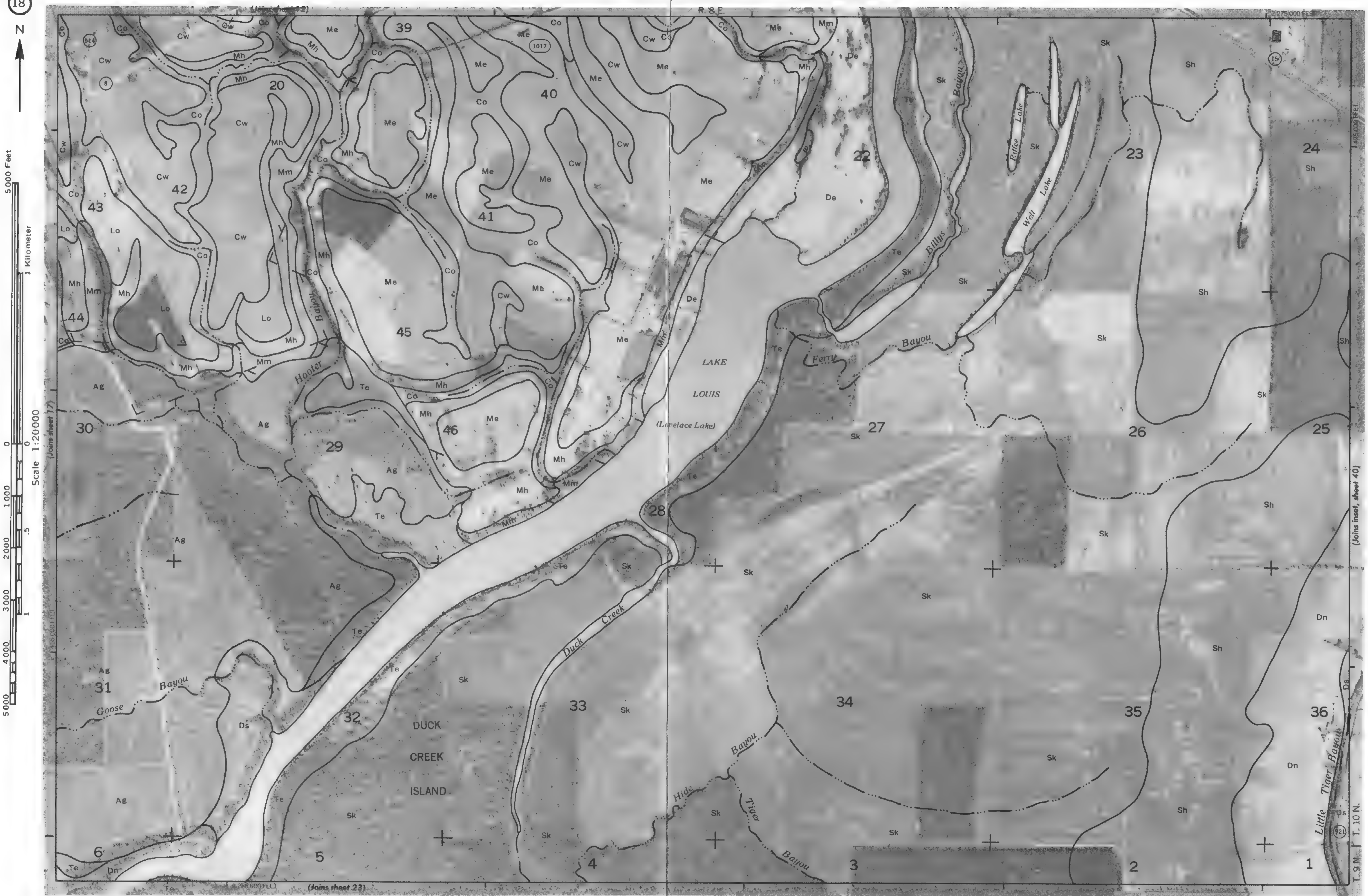
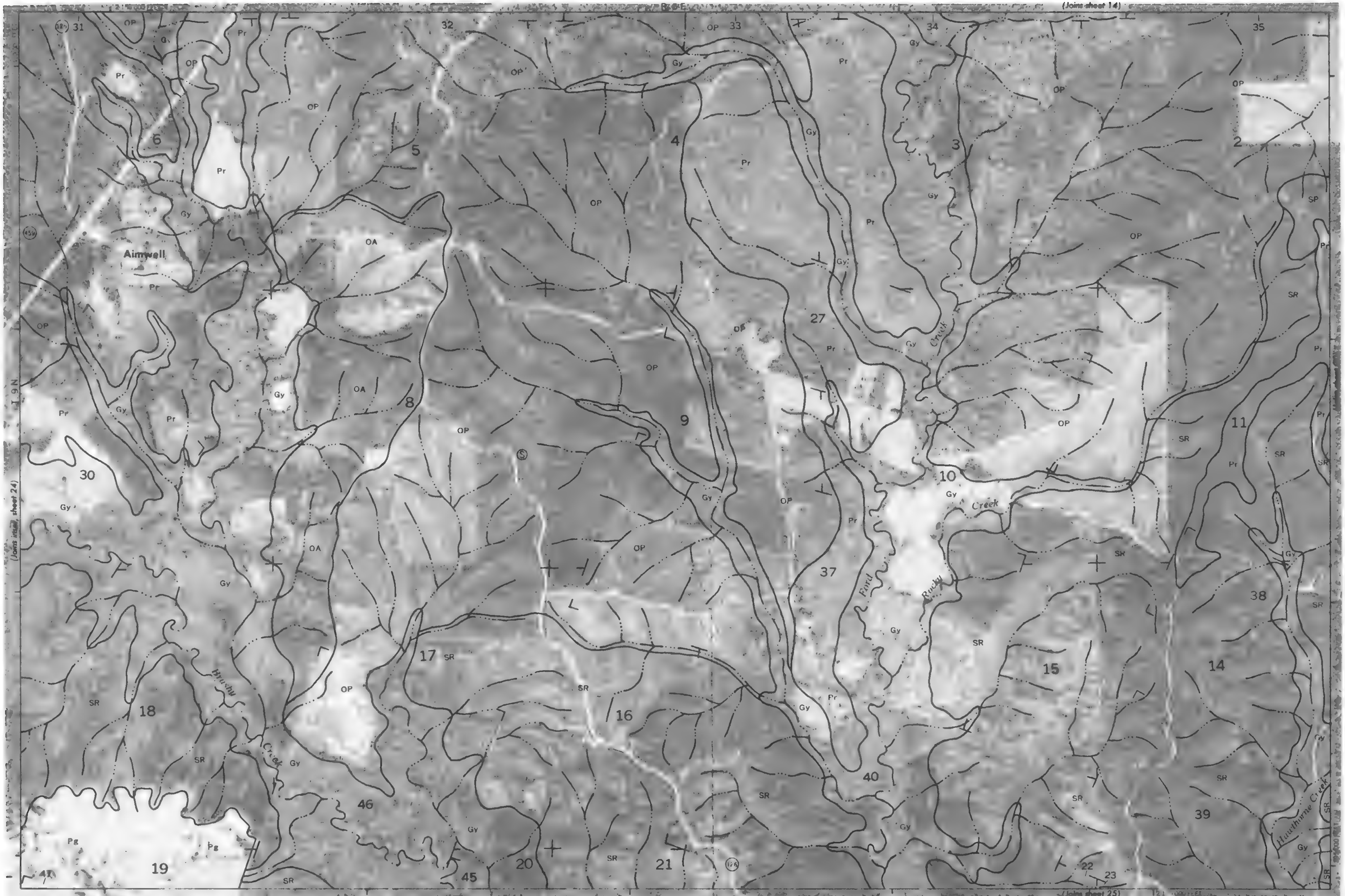


CATAHOULA PARISH, LOUISIANA NO. 17

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



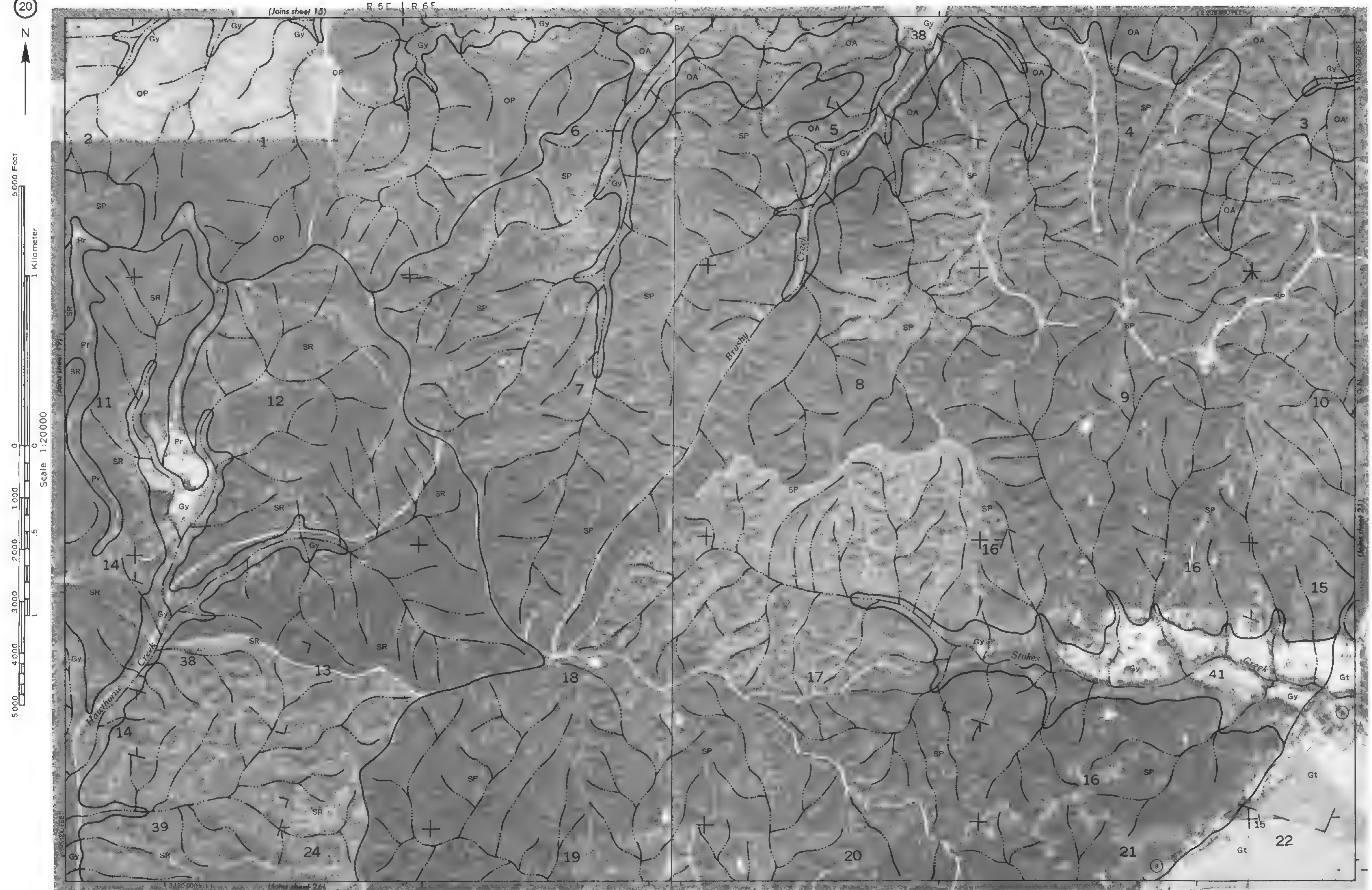
19

N

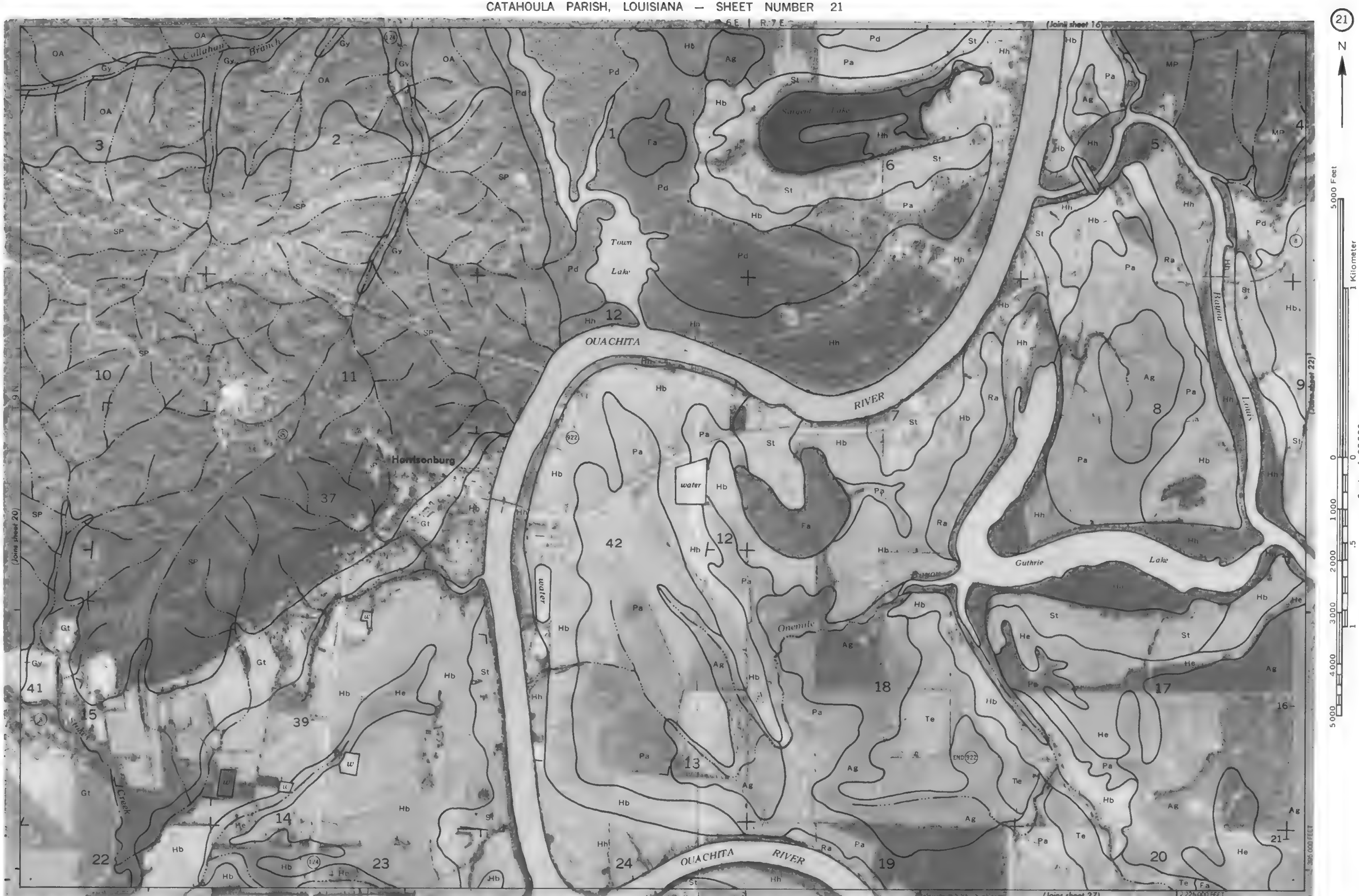
5000 Feet
1 Kilometer
Scale 1:20000
0 1000 2000 3000 4000 5000
0 .5 1

CATAHOULA PARISH, LOUISIANA NO. 19

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



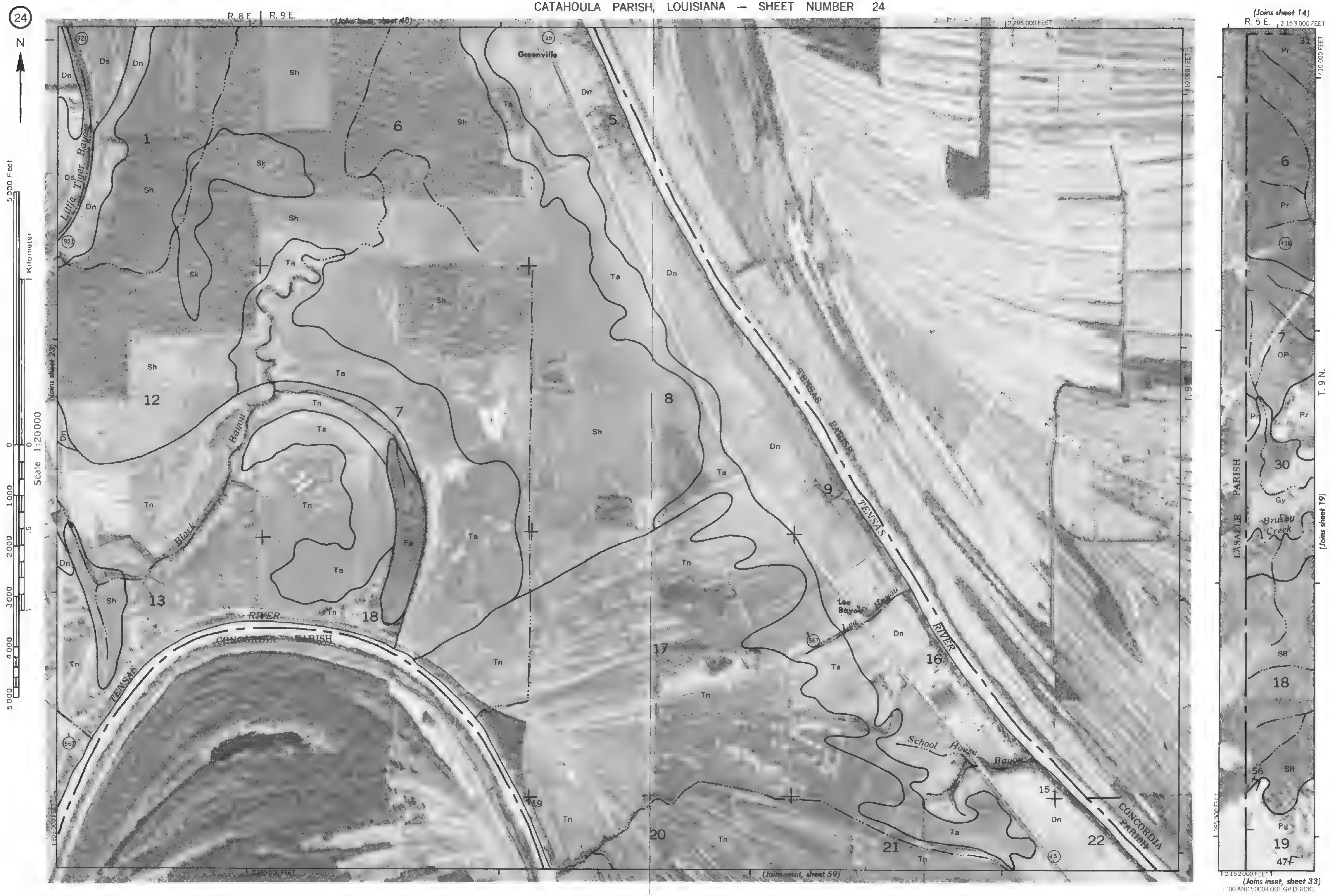
CATAHOULA PARISH, LOUISIANA NO. 21

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

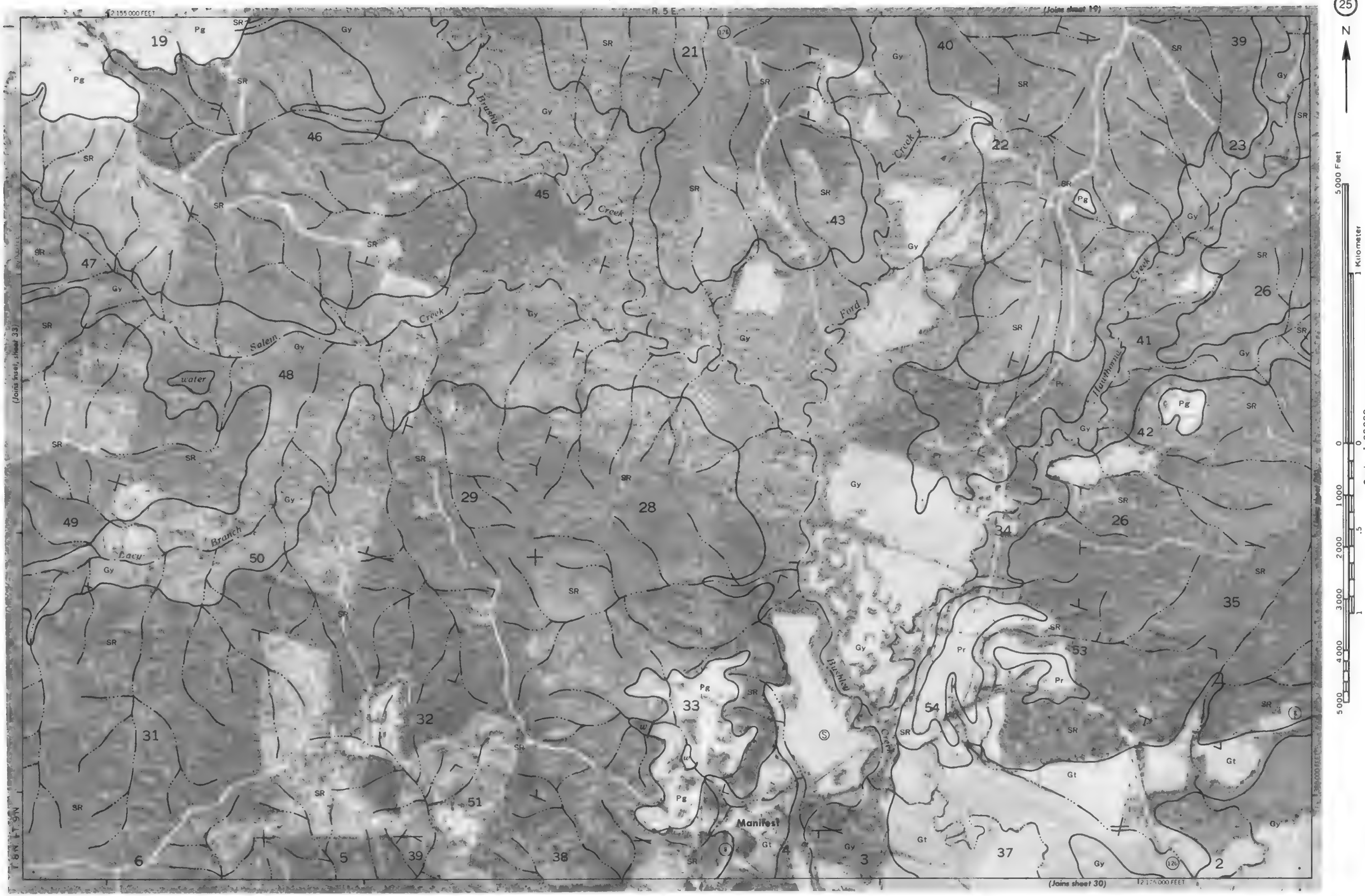
This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

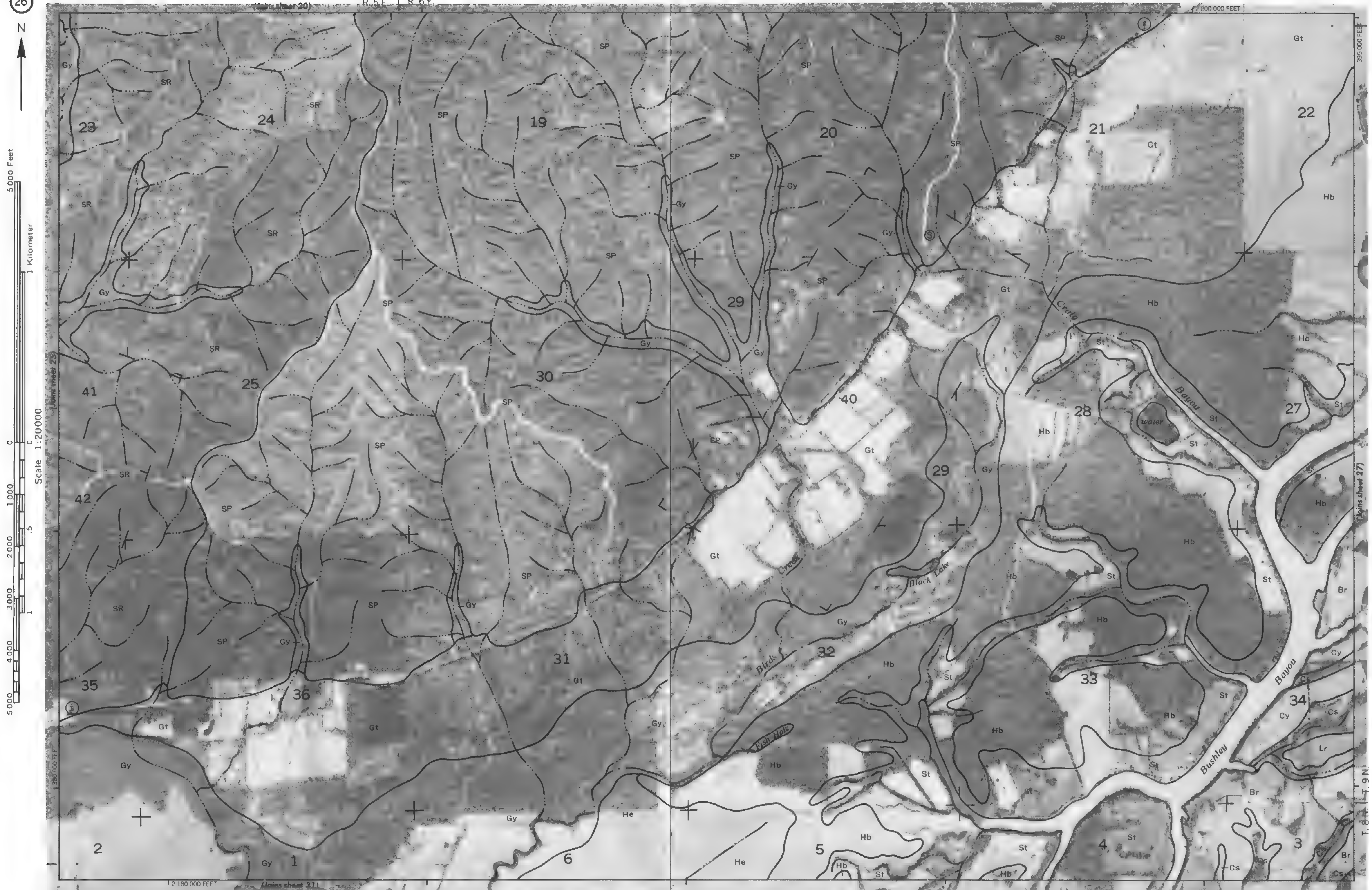
CATAHOULA PARISH, LOUISIANA NO. 23

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

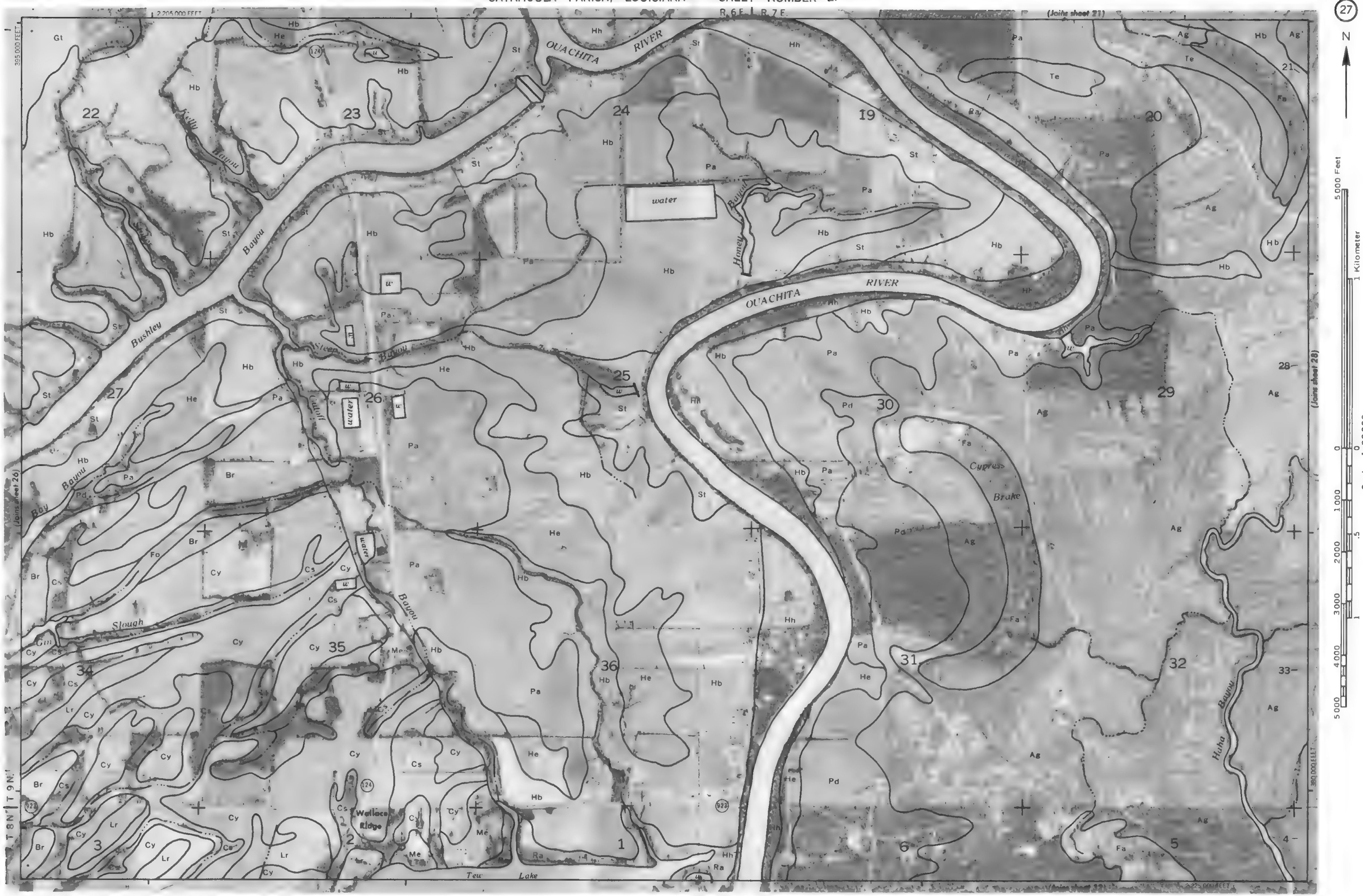


This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


2 155 000 FEET
R. 5 E.
(Joins sheet 19)
(Joins inset, sheet 33)
(Joins sheet 30)
2 175 000 FEET
Brushy
Creek
Salem
Ford
Hawthorne
Lacy
Branch
water
Manifest
T. 8 N.
N
5 000 Feet
1 Kilometer
Scale 1:20000
CATAHOULA PARISH, LOUISIANA NO. 25
This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



CATAHOULA PARISH, LOUISIANA NO. 27

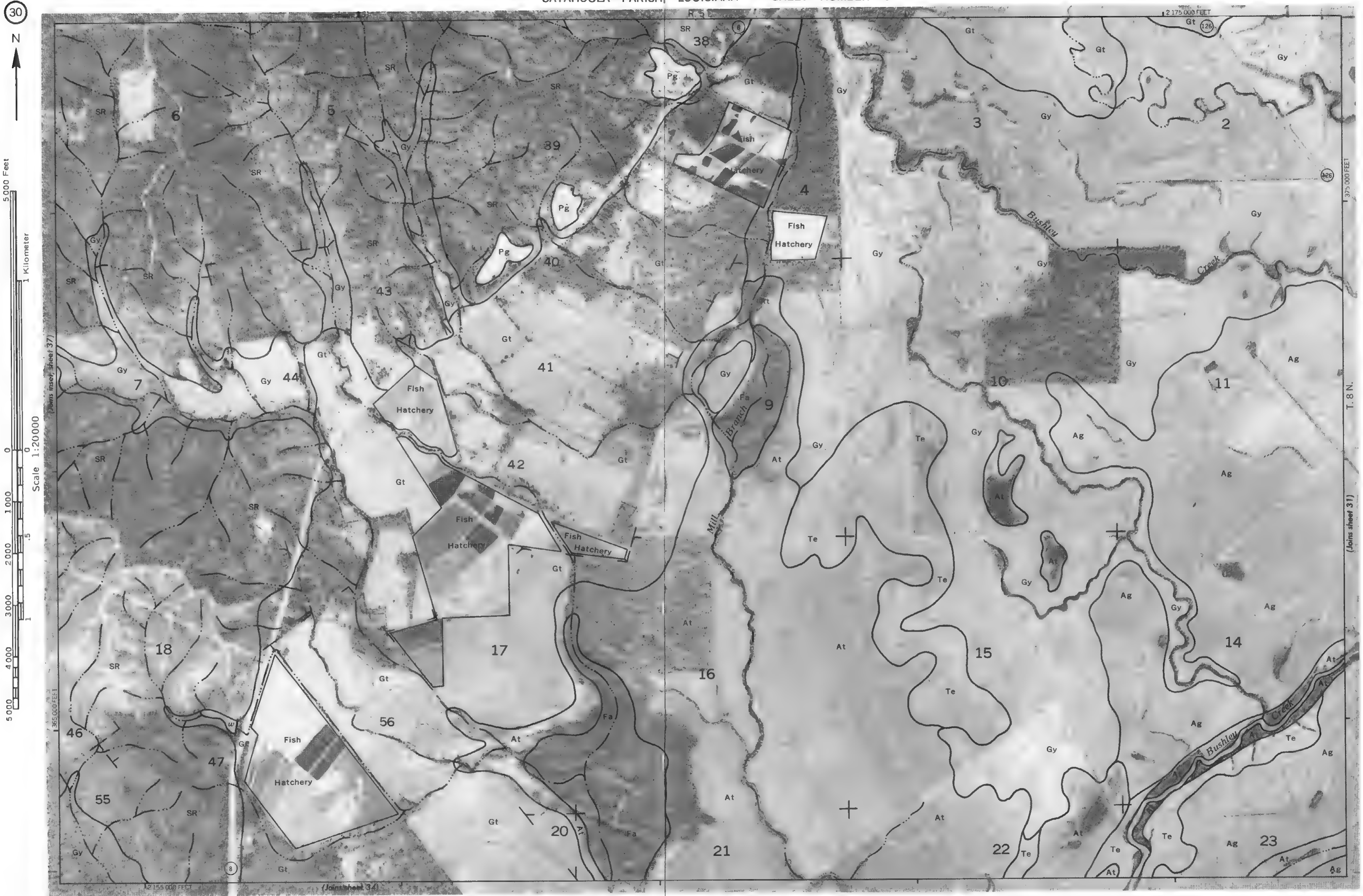
This map is compiled on 1979 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned

28

This map is compiled on 19__ aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CATAHOULA PARISH, LOUISIANA NO. 29

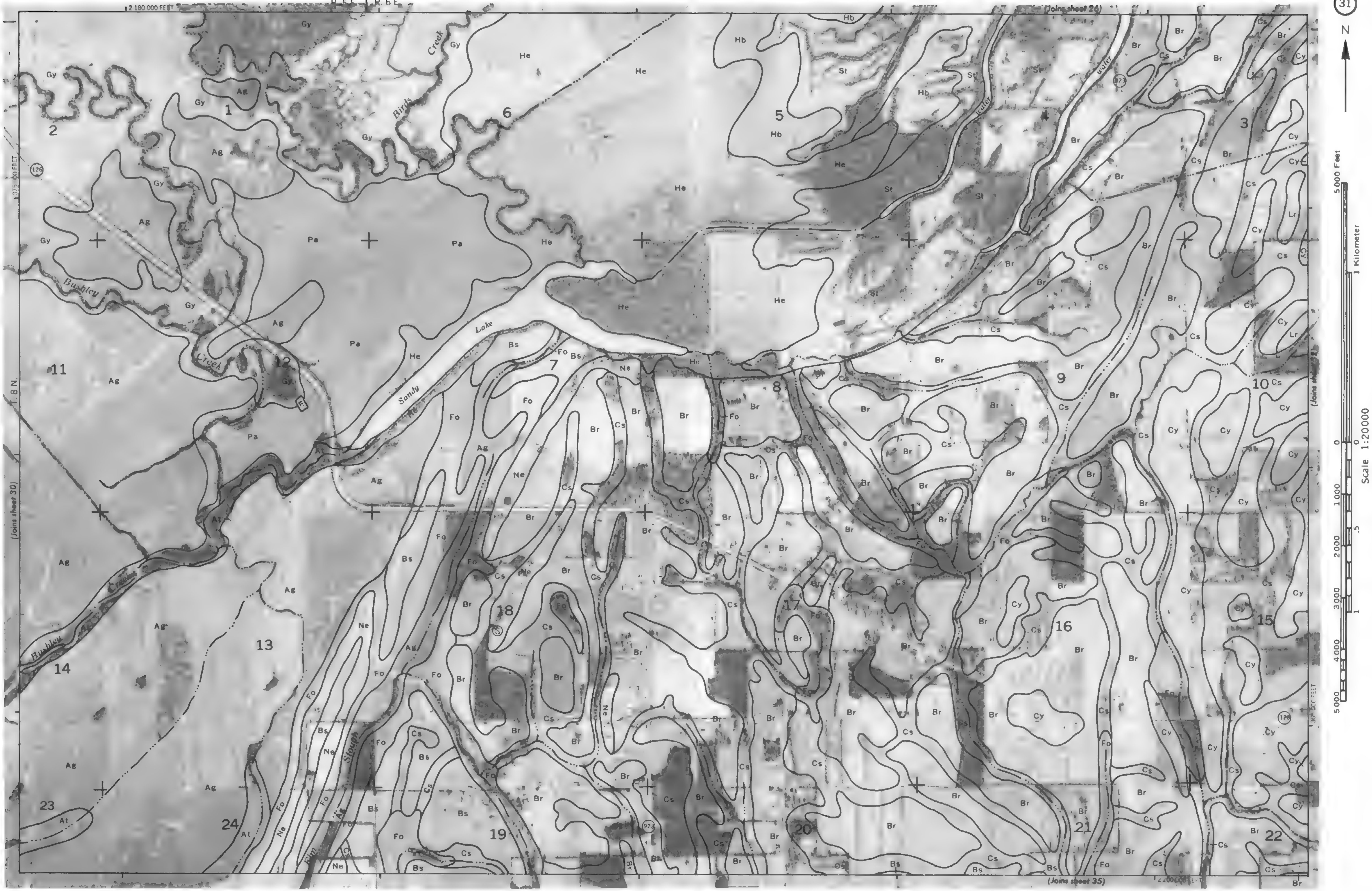
This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

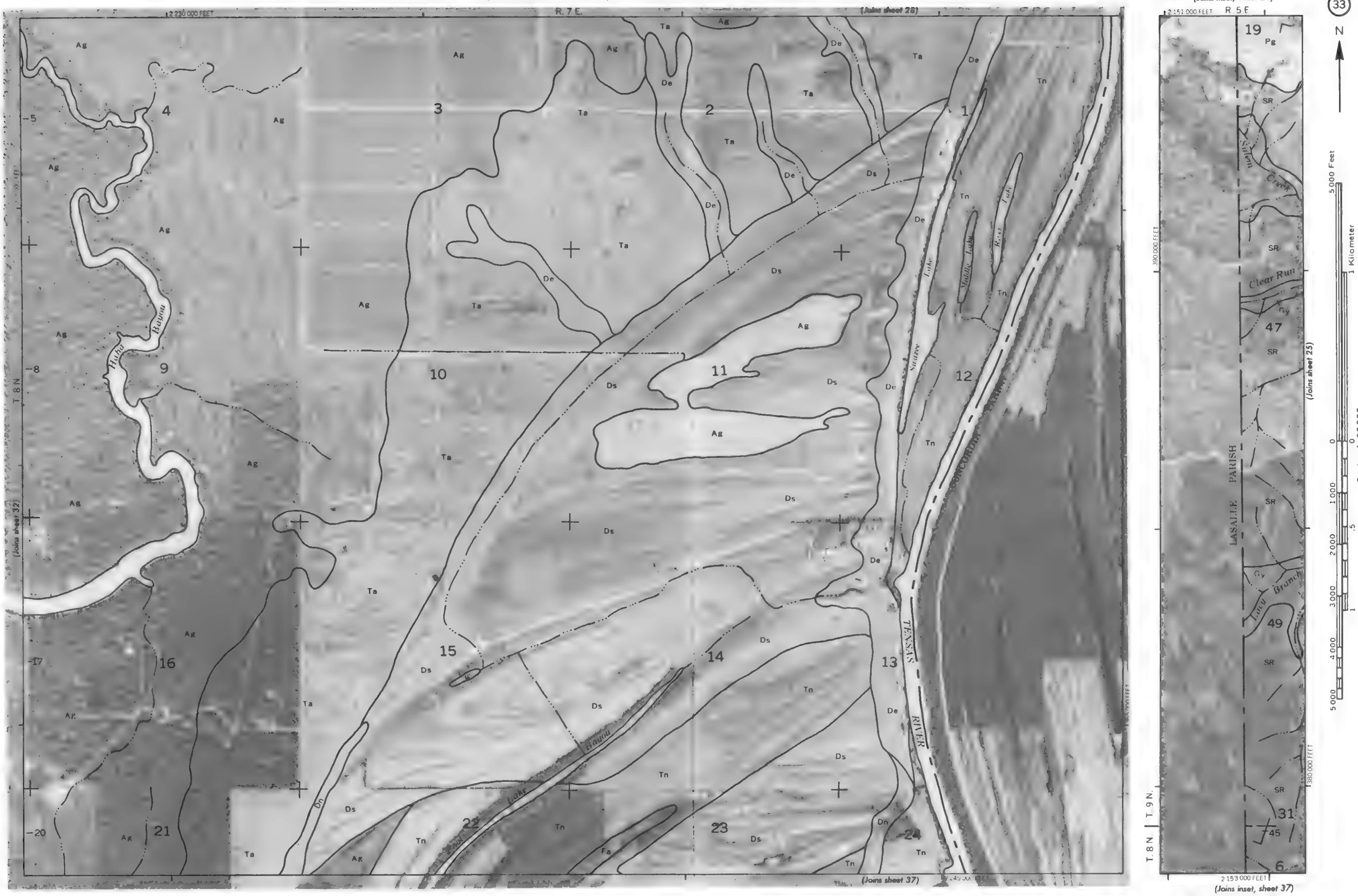
CATAHOULA PARISH, LOUISIANA NO. 31

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

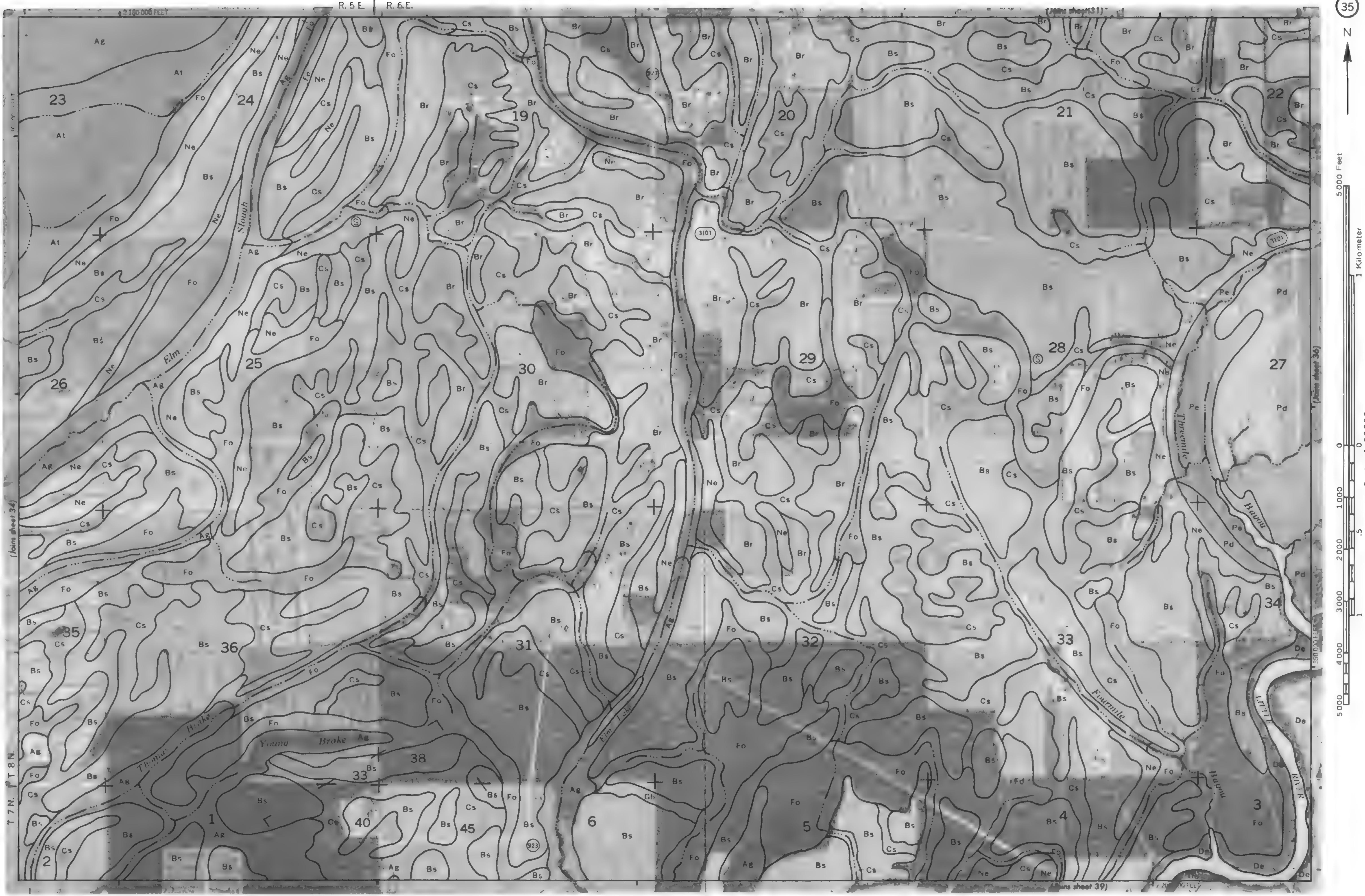
CATAHOULA PARISH, LOUISIANA NO. 32



CATAHOULA PARISH, LOUISIANA NO. 33

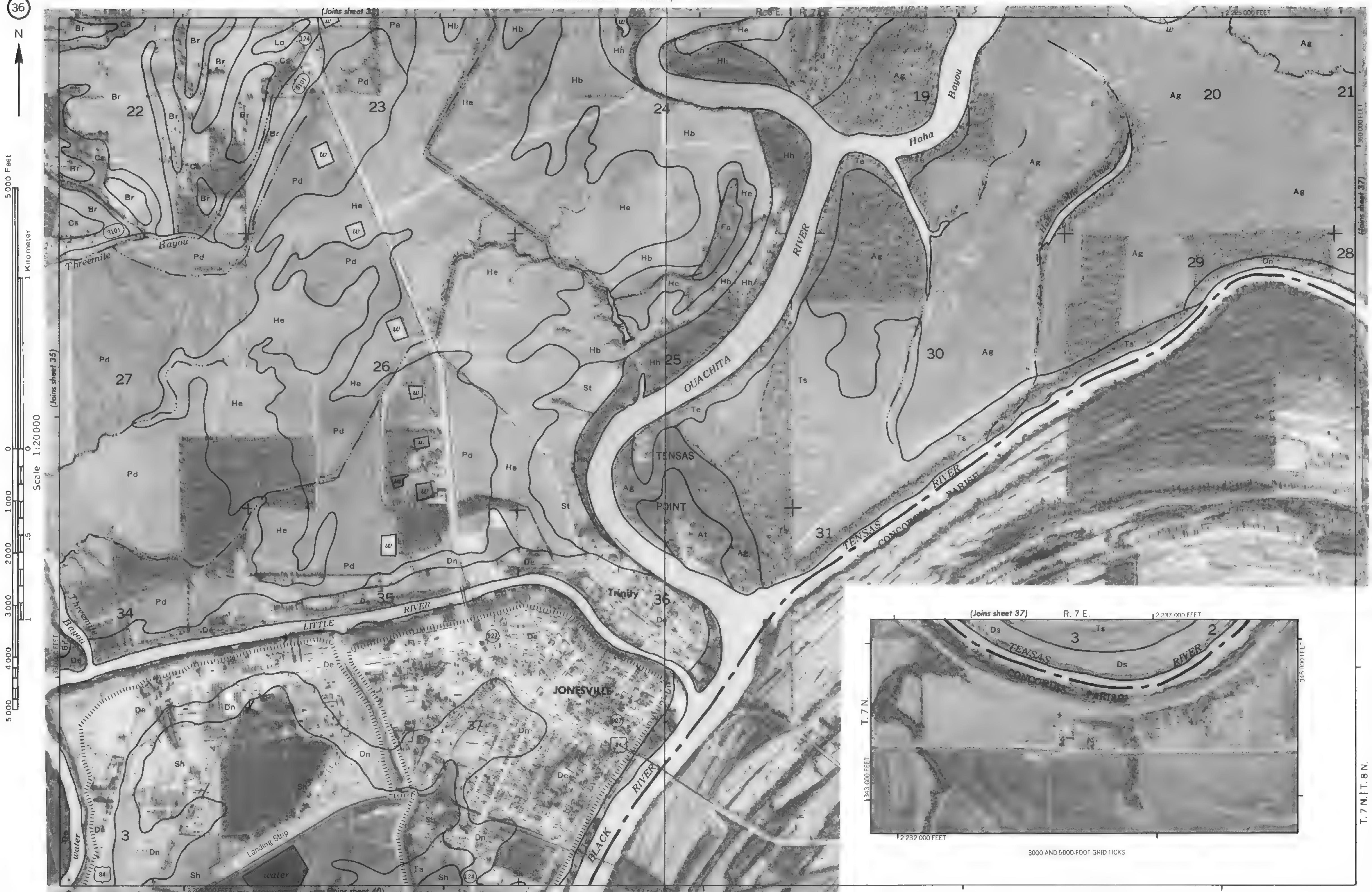
This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned



CATAHOULA PARISH, LOUISIANA NO. 35

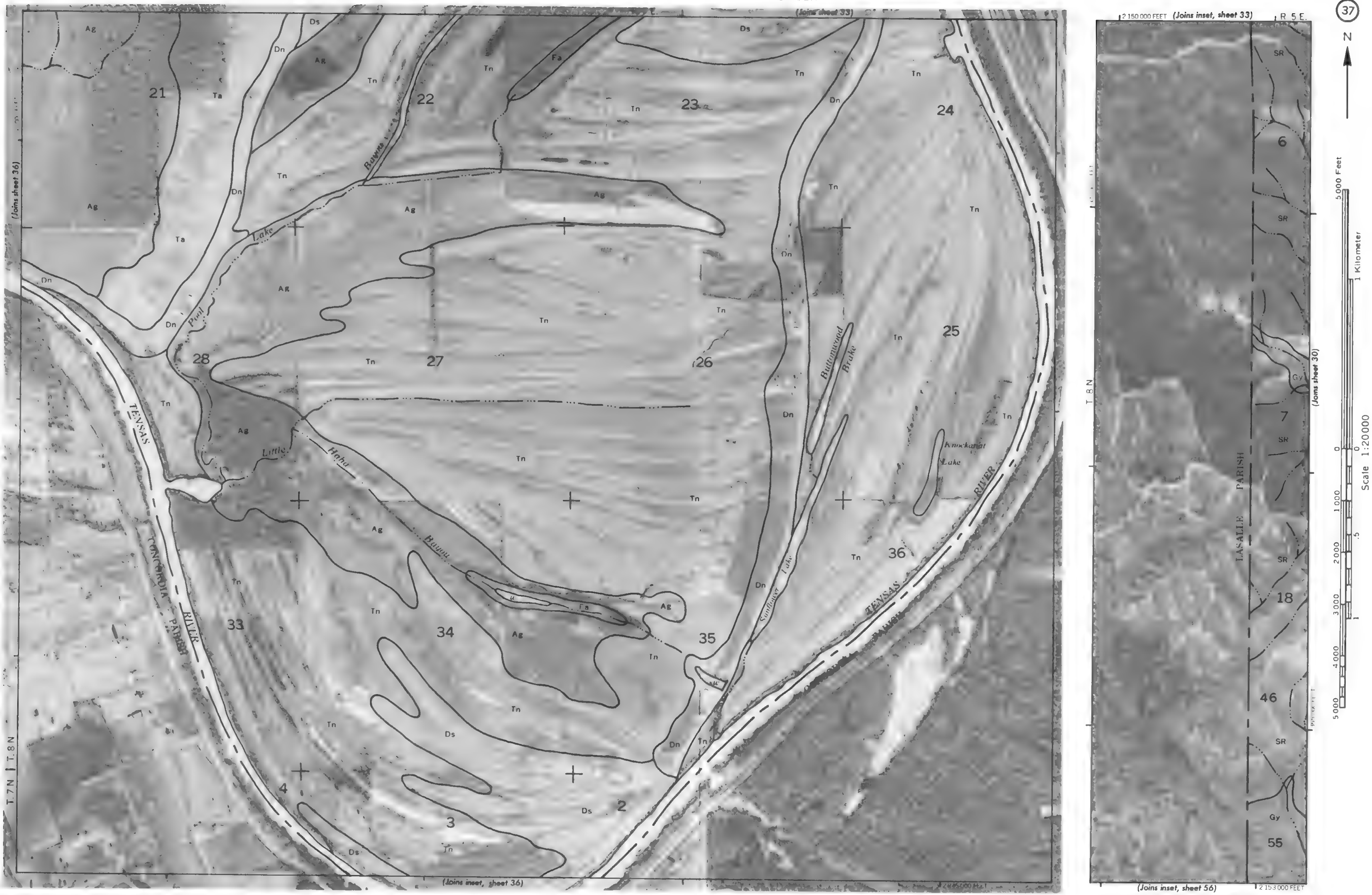
This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CATAHOULA PARISH, LOUISIANA NO. 37

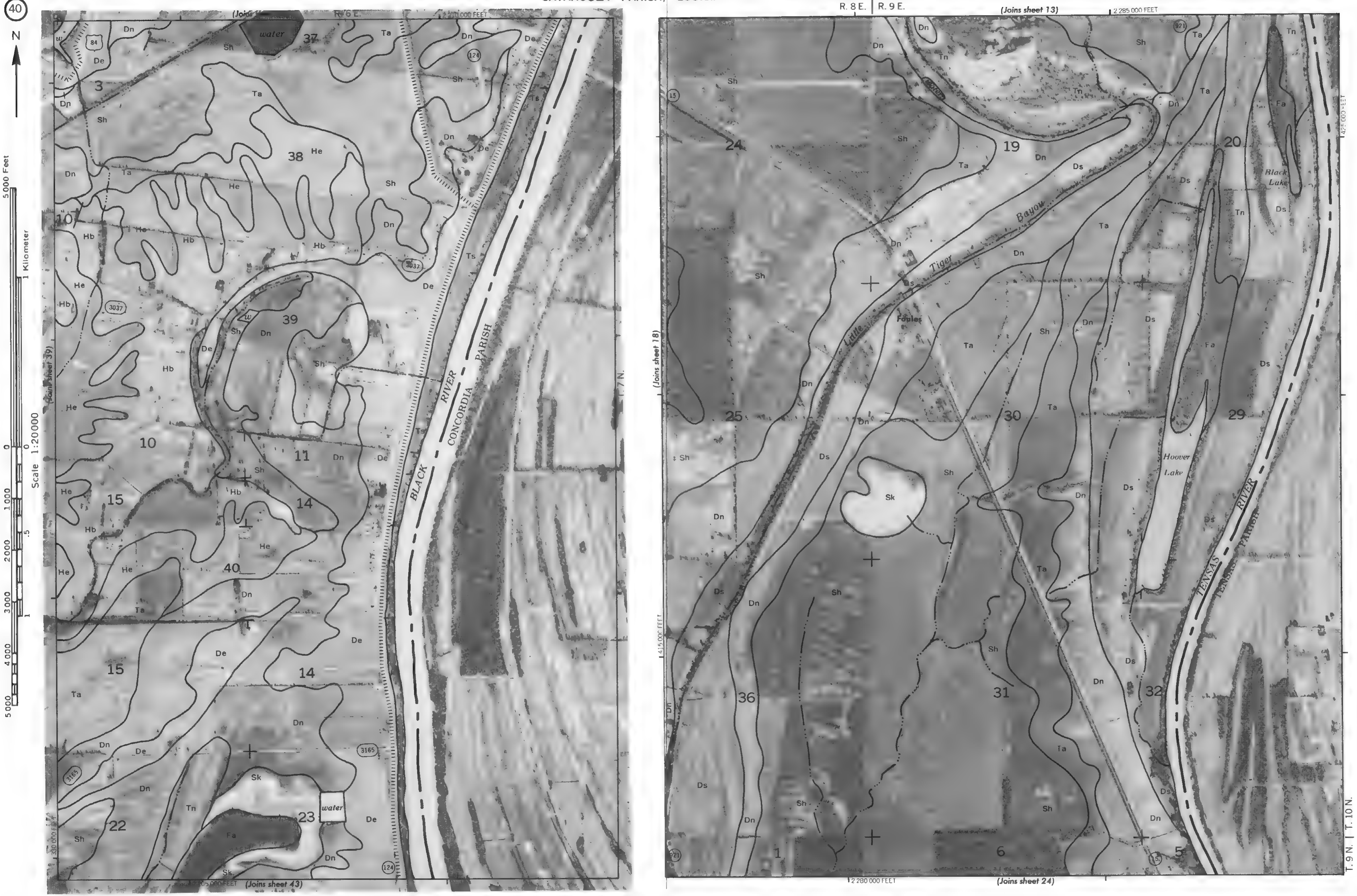
...ed on 1979 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned



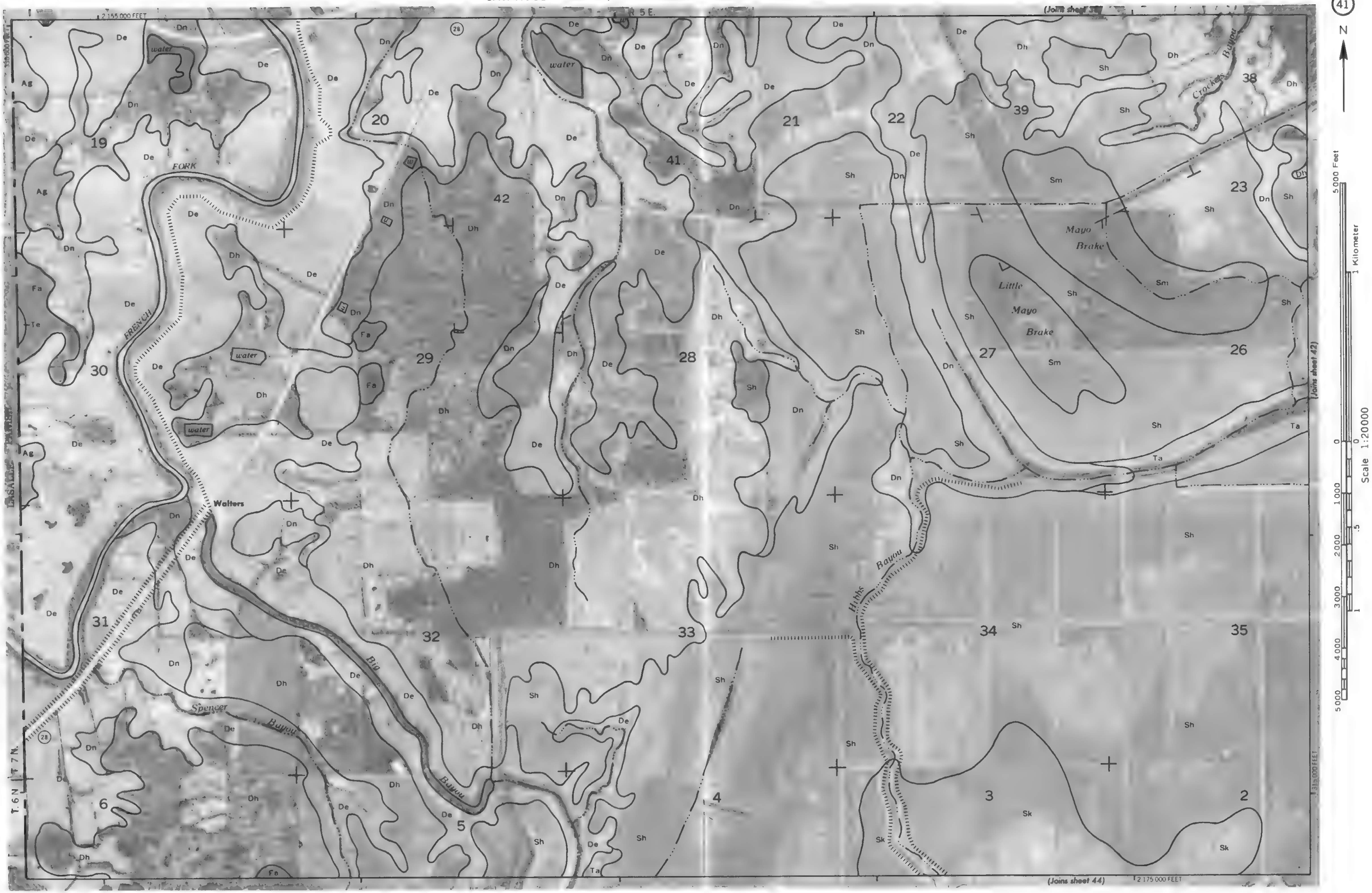
This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned

CATAHOULA PARISH, LOUISIANA NO. 39

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

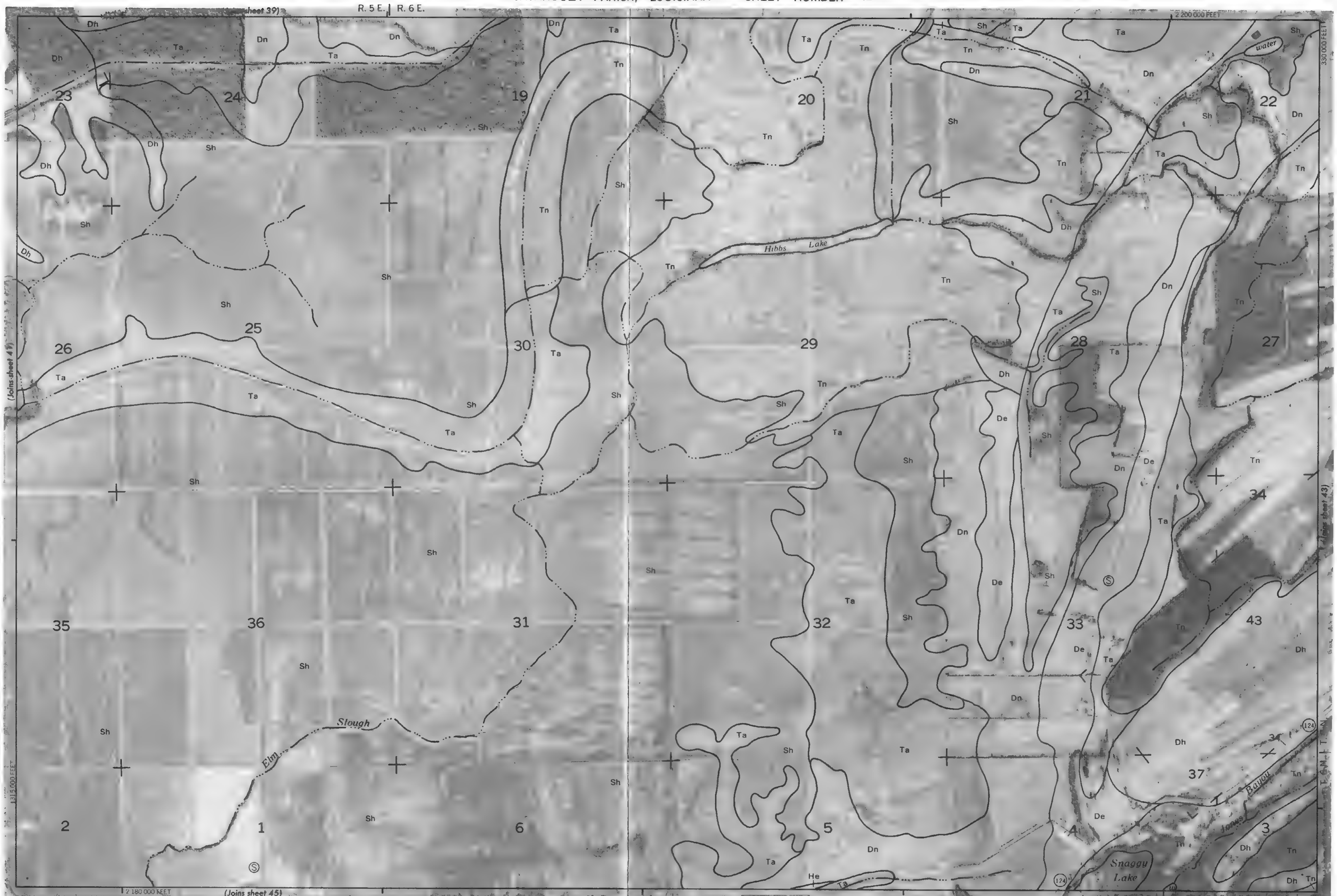


This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



CATAHOULA PARISH, LOUISIANA NO. 41

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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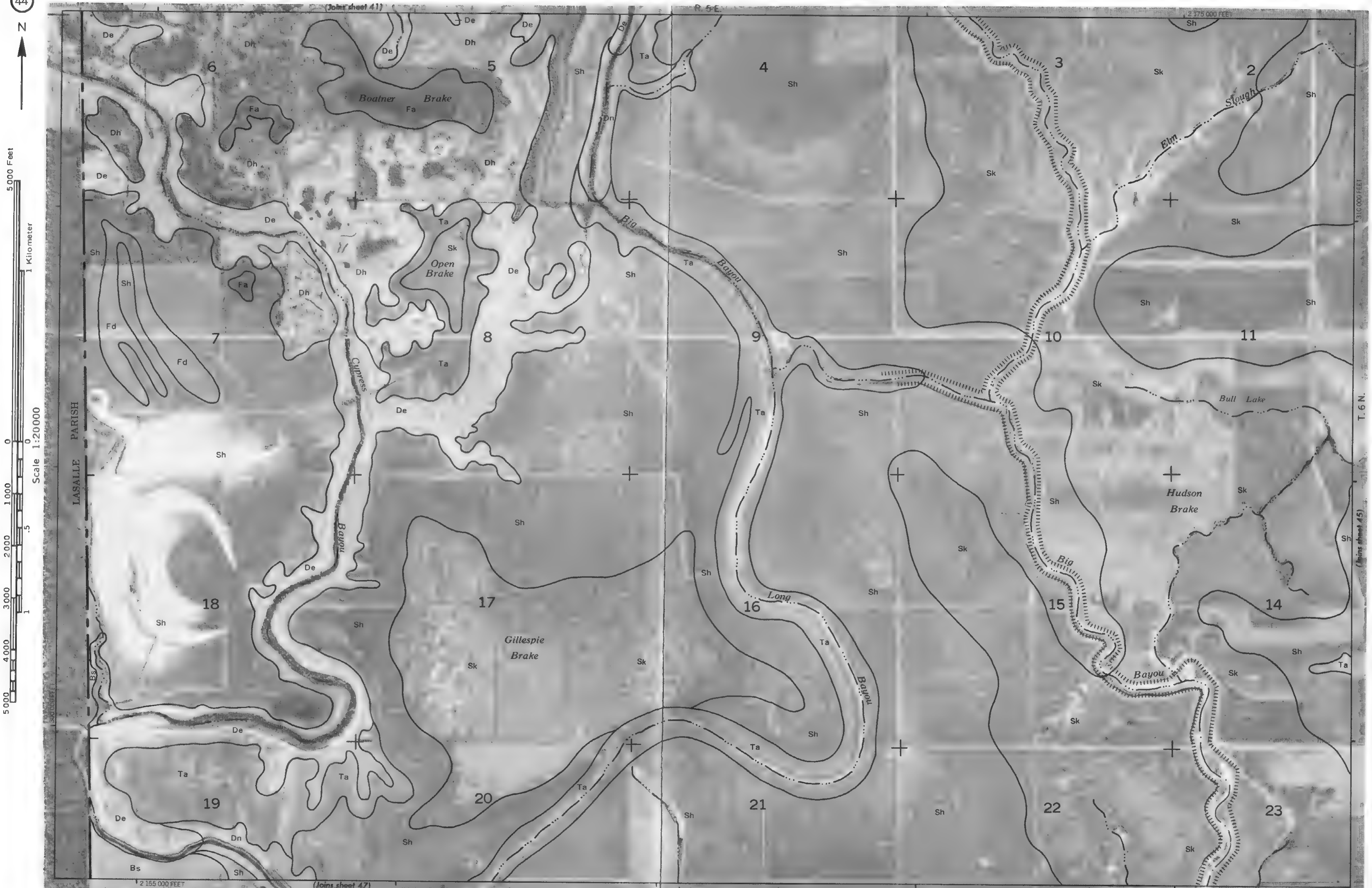
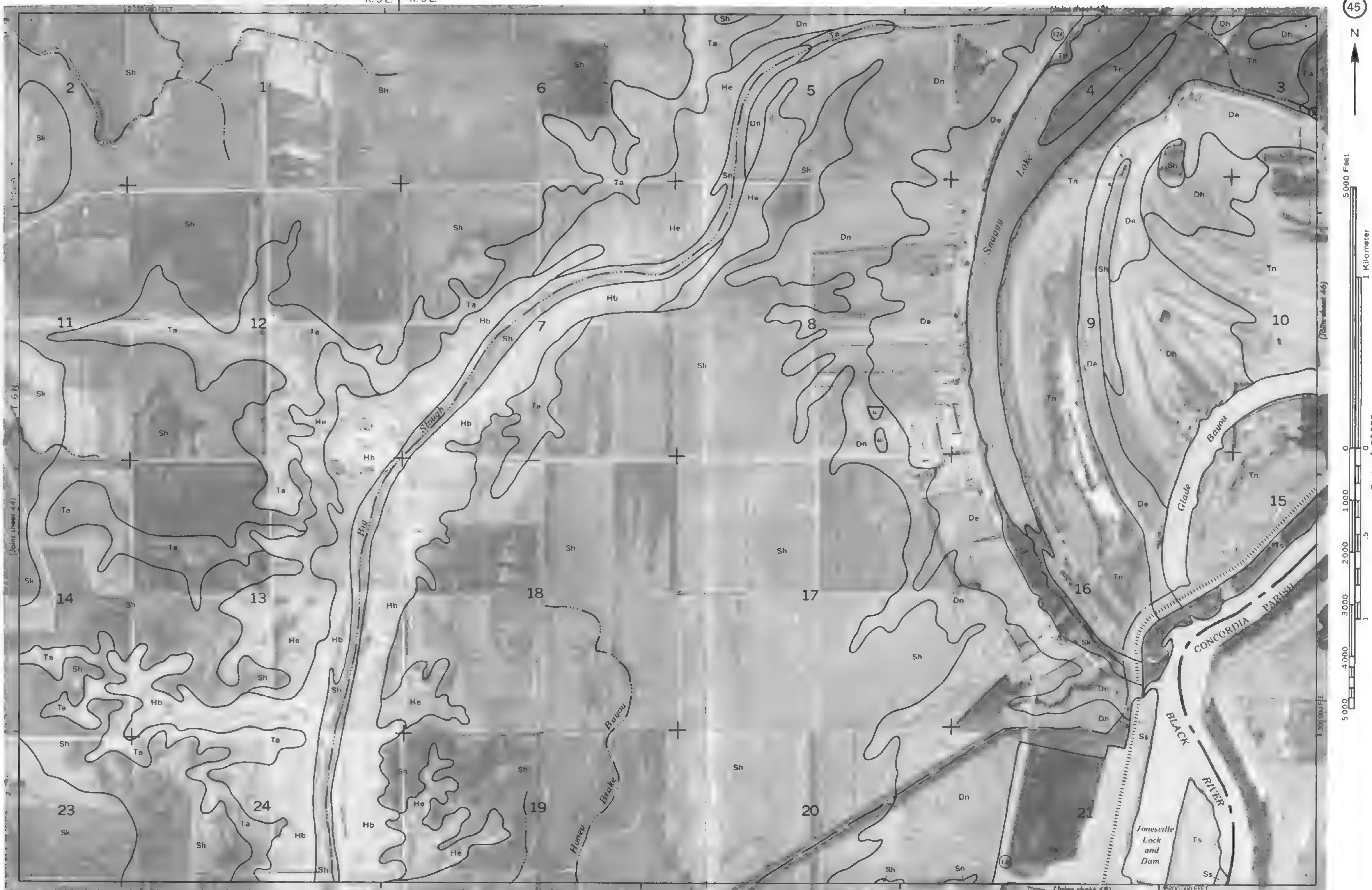
CATAHOULA PARISH, LOUISIANA NO. 43



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



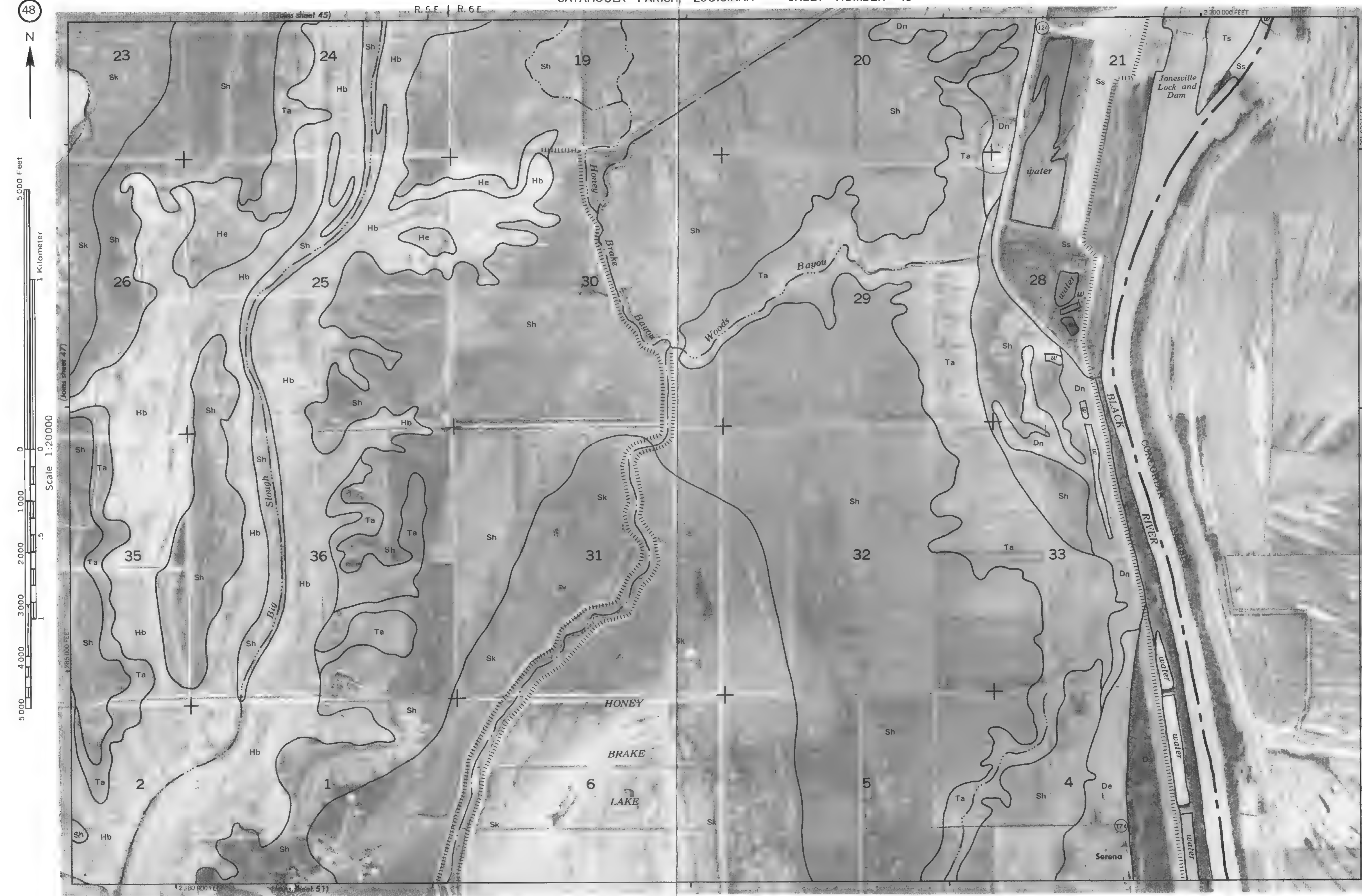
CATAHOULA PARISH, LOUISIANA NO. 45

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


46
N
5 000 Feet
1 Kilometer
Scale 1:20000
(Joins sheet 45)
(Joins sheet 49)
R 6 E.
T 6 N.
2 205 000 FEET
2 225 000 FEET
Willow Lake
Glade Bayou
Grassy Lake
Old River Slough
BLACK RIVER
CONCORDIA PARISH
water
This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CATAHOULA PARISH, LOUISIANA NO. 47

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

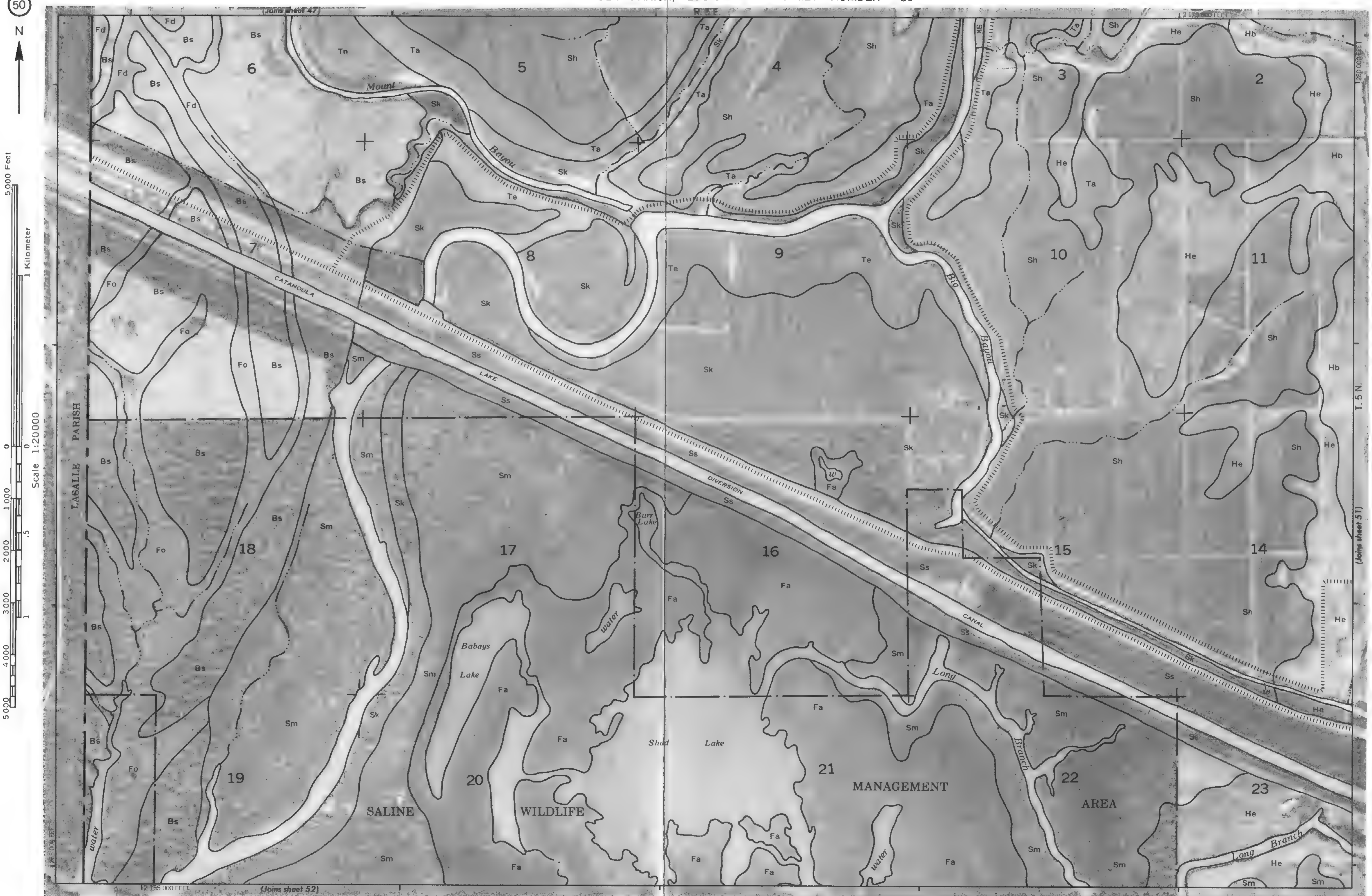


This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned

CATAHOULA PARISH, LOUISIANA NO. 48

CATAHOULA PARISH, LOUISIANA NO. 49

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CATAHOULA PARISH, LOUISIANA NO. 51

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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Coordinate grid ticks and land division corners, if shown, are approximately positioned

CATAHOULA PARISH, LOUISIANA NO. 52

CATAHOULA PARISH, LOUISIANA NO. 53

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned

54

N

Scale 1:20000

0 1000 2000 3000 4000 5000 Feet

0 .5 1 Kilometer

This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CATAHOULA PARISH, LOUISIANA NO. 55

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
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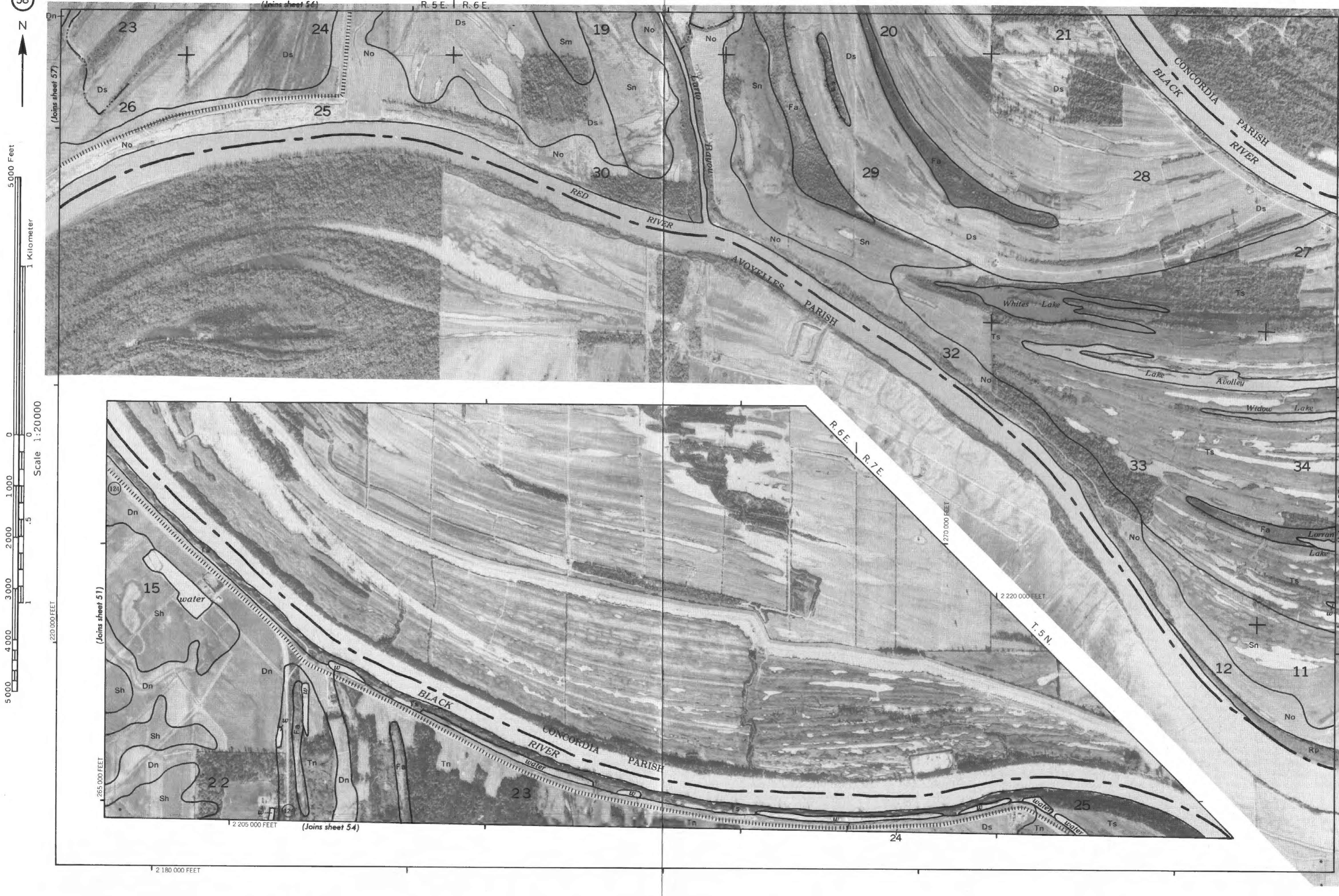
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CATAHOULA PARISH, LOUISIANA NO. 57

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CATAHOULA PARISH, LOUISIANA NO. 59

This map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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